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BIBLIOGRAPHY

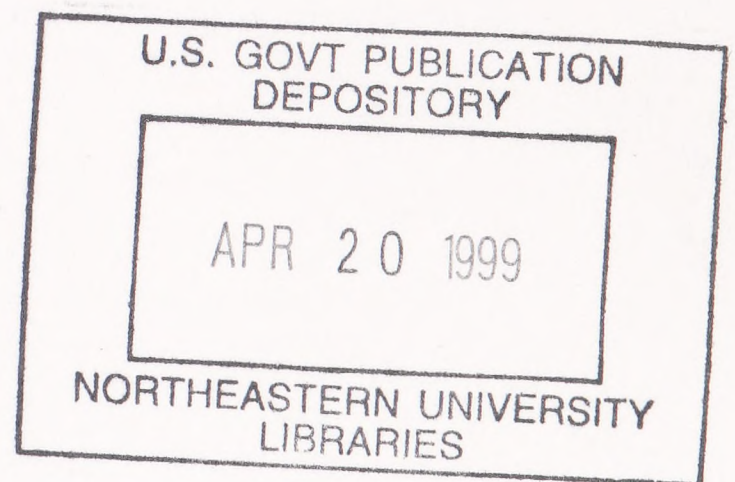






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# ANTARCTIC BIBLIOGRAPHY

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# Introduction

This volume is the twenty-fifth in a continuing series of compilations presenting abstracts and indexes of current antarctic literature published since 1962. A companion volume to the series, *Antarctic Bibliography; 1951-1961*, extends the coverage retrospectively. The material has been compiled by the Cold Regions Bibliography Project (CRBP) at the Library of Congress in collaboration with the Scott Polar Research Institute of the University of Cambridge, over a period of 12 months; the cut-off date for inclusion in this volume was December 1997.

The present volume contains abstracts numbered from 56,345 to 58,360. The first five volumes each contained 2,000 abstracts. Thus, items 1-2,000 appeared in v.1 (published in 1965), items 2,001-4,000 in v.2 (1966), items 4,001-6,000 in v.3 (1968), items 6,001-8,000 in v.4 (1970), and items 8,001-10,000 in v.5 (1971). V.6 (1973) contained items 10,001-12,244, v.7 (1974) items 12,245-14,447, v.8 (1976) items 14,448-16,899, v.9 (1977) items 16,900-19,248, v.10 (1979) items 19,249-21,721, v.11 (1980) items 21,722-24,083, v.12 (1982) items 24,084-26,452, v.13 (1983) items 26,453-28,961, v.14 (1985) items 28,962-31,756, v.15 (1986) items 31,757-34,660, v.16 (1988) items 34,661-37,522, v.17 (1989) items 37,523-40,798, v.18 (1990) items 40,799-42,875, v.19 (1991) items 42,876-45,062, v.20 (1993) items 45,063-47,376, v.21 (1994) items 47,377-49,497, v.22 (1995) items 49,498-51,653, v.23 (1996) items 51,654-54,041 and v.24 (1997) items 54,042-56,344.

The material is arranged in sections representing thirteen subject categories (see table of contents). Items that apply to two or more categories are listed in one section only and cross referenced at the end of the other pertinent sections. Because of this scheme of arrangement, some items dealing with the same subject (from different aspects) will be found in two different categories; e.g. some papers on marine sediments may be found in Section E (Geological Sciences), and others in J (Oceanography). Within each section, abstracts are arranged by accession number; the indexes are keyed to these numbers.

Foreign-language titles are given in English translation first, with the original title following in brackets. Transliteration of Cyrillic and romanization of oriental languages follow the Library of Congress systems. Some of the citations are followed by library call numbers, preceded by the library symbols commonly used in union catalogs.

As a rule, the abstracts are informative rather than descriptive, but no attempt is made to verify or critically evaluate the author's statements or conclusions. Author abstracts are either used verbatim or modified for the sake of brevity or conformity to guidelines adopted for this bibliography.

Four indexes are provided: (1) an author index that includes coauthors (anonymous journal articles are referred to by the article title); (2) a subject index that occasionally extends to two levels of subheadings and contains cross-references; (3) a geographic index to names of places, stations, and geographic features as approved by the U.S. Board on Geographic Names; and (4) a grantee index to names of organizations or institutions that received financial support from the National Science Foundation for work that resulted in publications abstracted in the volume. In each index, entries are cited by a letter, indicating the subject category, followed by the accession number: for example, B-42469 refers to section B, Biological Sciences, item number 42469.

Although the majority of the publications abstracted are in the collections of the Library of Congress, many significant items were lent by or exchanged with other institutions, made available by the Office of Polar Programs of the National Science Foundation, or



received as review copies or reprints directly from publishers and authors. Because they contribute to more current and complete coverage, review copies and reprints are especially valuable, and publishers and authors are encouraged to send them to the Library of Congress, Science, Technology, and Business Division, Cold Regions Bibliography Project, Washington, D.C. 20540-4750, U.S.A.

Requests for photoreproductions of documents cited in this bibliography, except material protected by copyright, should be directed to the Library of Congress, Photoduplication Service Dept. C-177, 10 First Street SE, Washington, D.C. 20540. U.S. government or government-sponsored technical reports may, in most cases, be obtained from the National Technical Information Service, Springfield, VA 22151. For such reports, NTIS order numbers are usually included in the bibliographic citation.

For online searching of the *Antarctic Bibliography* as well as the entire CRBP database, visit the CRBP website: [lcweb.loc.gov/rr/scitech/coldregions/welcome.html](http://lcweb.loc.gov/rr/scitech/coldregions/welcome.html). To search monthly accessions to the database, with abstracts, titled "Current Antarctic Literature" see: [www.crrel.usace.army.mil/library](http://www.crrel.usace.army.mil/library).

For information on the CD-ROM version of the database call National Information Services Corporation (410-243-0797).

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## A. GENERAL

### A-56353

Argentina. Centro Naval, Delegación Bahía Blanca, **Antarctica: a different world** [La Antártida: un espacio distinto], var. p., In Spanish. Transcript of a cycle of presentations given at the Universidad Nacional del Sur, Bahía Blanca, Argentina, Sep. 25-27, 1990. Unpublished manuscript.

The volume consists of 6 presentations, preceded by a brief curriculum vitae of the author, dealing with the following subjects relative to Antarctica: conservation, renewable and non-renewable resources and geopolitics, logistics and the presence of Argentina in Antarctica, the Antarctic Treaty System, and the prospects of Argentina in the light of the "antarctic question".

### A-56357

U.S. National Science Foundation. Polar Operations Section, **Background information concerning the ARA Bahía Paraíso grounding in Arthur Harbor, Antarctica**, var. p., Unpublished manuscript. Compiled Sep. 30, 1991.

This is a compilation of reports and other documents relating to the Jan. 1989 grounding and subsequent sinking of the Argentine polar supply ship ARA *Bahía Paraíso*. It provides information concerning emergency response actions taken at the time of the accident, current status of the wreck, known environmental impact to date, and assessment of optional future actions. A chronology of response action key events is included.

### A-56370

Ensminger, J.T., Blasing, T.J., **Use of explosives by the US Antarctic Program, Oak Ridge National Laboratory. Environmental report**, June 1995, ORNL/TM-13031, 39p., DE95-016398, Refs. p.36-38.

This report was prepared to assist principal investigators and others in complying with NEPA and the protocol on environmental protection to the Antarctic Treaty. Research activities and associated support operations in Antarctica sometimes require use of explosives. This report evaluates potential environmental impacts associated with such activities and possible methods for mitigating those impacts. The greatest single use of explosives, and the only type of blasting that will occur on the Polar Plateau (an exception is the rare use of explosives to cave in dangerous ice for safety reasons), is for seismic surveys. The charges for these are small-scale, are placed in or on the snow or ice, are distributed linearly over long distances, and present no potential impacts to soil or geological substrata. Impacts from those would be less than minor or transitory. Wherever possible, blasting holes in sea ice will be replaced by drilling by auger or melting. Other uses of explosives, such as in geologic research and construction, are discussed. (Auth.)

### A-56389

Berkman, P.A., **Conservation of the antarctic marine ecosystem and the development of global resource management strategies**, MTS '92, Washington, D.C., Oct. 19-21, 1992. Proceedings. Global ocean partnership. Vol.1, Washington, D.C., Marine Technology Society, 1992, p.30-36, 24 refs.

### DLC GC2.M78 1992

It is argued that as we progress into the 21st century and beyond, it will become increasingly important to identify precedents for creating comprehensive global resource management strategies that integrate economics and politics across the continuum from basic to applied science. To be effective, such precedents would need to demonstrate continuous cooperative international management of a common resource. The scientific process which facilitated the evolution of conservation measures for the antarctic marine ecosystem can be extended to other resources which require cooperative international management. In a global context, man-

agement of the antarctic marine ecosystem is a model international laboratory for integrating rational resource utilization with science, environmental protection, and diplomacy. (Auth. mod.)

### A-56399

Oceanites, **Antarctic Century newsletter**, Dec. 1991, No.7, Cooksville, MD, 1991, 11p.

This issue consists of an opening article discussing antarctic tourism, and forecasting a poor 1991-1992 shipboard tourism season due to the U.S. economic recession and plans to establish tourism controls. It is followed by a review of codes and values, such as the Antarctic Travelers's Code, the Antarctic Treaty politics regarding tourism, a Treaty update, and other miscellaneous news items.

### A-56400

ANARE Club, **Aurora**, Dec. 1996, Vol.16, No.2, Melbourne, 1996, 32p.

The articles and news items in this issue deal with the following: an account of how the first 2 ANARE automatic weather stations were established: on Lewis I. in 1958, and on Chick I. in 1961; a review of the ozone depletion features; the 1961 Wilkes Party Reunion, held in Sydney, Australia, Nov. 16-18, 1996; a list of ANARE wintering expeditioners, 1989-1996, at Casey Station; an account of the 1st year of operations at Casey Station in 1969; personnel awards; some 1992 events at Amundsen-Scott Station; and ANARE miscellaneous news items.

### A-56401

Antarctic Society of Australia, **Newsletter**, No.45, June 1996, Pymble, New South Wales, 1996, 20p.

This issue consists of brief news items concerning the following: the whale research program on 2 ANARE voyages, July-Sep. 1995 and Jan.-Mar., 1996; an update of the status of the Madrid Protocol enabling legislation in various countries; a large freshwater lake beneath the ice in central East Antarctica; the U.S. National Science Foundation rescue of the Russian stranded polar team at Mirnyy Station, by dropping off more than 3.5 tons of food during the 1996 winter; a full report on the 20th Antarctic Treaty Consultative Meeting, held in Utrecht, The Netherlands, Apr. 29-May 10 1996, with outlines of key issues and principal outcomes; and a brief comment on the decline in the concentration of ozone depleting substances.

### A-56411

Fox, A.J., Roberts, A., **Pioneers of photogrammetry commemorated in antarctic place-names**, *Photogrammetric record*, Oct. 1996, 16(88), p.601-605, With French and German summaries. 3 refs.

Unique place-names are essential for scientific fieldwork in Antarctica. This contribution describes how duplication of place-names in British Antarctic Territory has been avoided by the systematic naming of geographically related features according to groups of associated ideas. One such theme, commemorating pioneers in the development of photogrammetry, recognizes the important contribution of photogrammetry to antarctic mapping and research. (Auth.)

### A-56413

Antarctic Society of Australia, **Newsletter**, No.47, Dec. 1996, Pymble, New South Wales, 1996, 20p.

This issue opens with predictions regarding ozone hole concentrations in 1996. It continues with comments on antarctic fishing, fisheries management, and a report on the 48th annual meeting of the IWC, held in Aberdeen, Scotland, June 24-28, 1996, with information on whaling activities by various countries. Highlights of the recommendations and resolutions of the International Union for Conservation of Nature and natural resources relating to Antarctica and the southern ocean, and of the World



Conservation Congress held on Nov. 5 and Oct. 14-23 1996, respectively, are provided. The issue concludes with ANARE miscellaneous news items, including its close monitoring of the movements of 2,600 sq km of ice that has broken off from the West Ice Shelf, in East Antarctica.

#### A-56485

Bhattacharya, B.B., **Schirmacher Oasis: environment, history and the Indian station "Maitree"**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.171-186, Refs. p.178-179.

#### DLC G850.I53I53 1984

The history and environment of the Schirmacher Ponds, discovered in 1938 by a German expedition and located at less than 100 km from Dakshin Gangotri Station, and that of Maitri Station, located in the Ponds area, are discussed. The importance of geochronological data obtained at the Ponds, for studies of Gondwanaland break-up, is emphasized. The significant role that Maitri Station is expected to play in large scale aerial geophysical surveys of the Schirmacher Ponds is pointed out.

#### A-56500

Hempel, G., **Life on the ice: marine research in the Arctic and the Antarctic** [Leben im Eis - Meeresforschung in Arktis und Antarktis], *Das Papier*, Nov. 1995, 49(11), p.674-676, 678, 680, 682-683, In German. 1 ref.

The article provides an overview of on-going research in polar areas, identifying the inhabitants and their activities; research programs and dwellers in the pack ice; the role of research vessels and their facilities. Activities in both polar regions are included but the major thrust is in the southern area.

#### A-56504

Hankin, S., Harrison, D.E., Osborne, J., Davison, J., O'Brien, K., **Strategy and a tool, Ferret, for closely integrated visualization and analysis**, *Journal of visualization and computer animation*, July-Sep. 1996, 7(3), p.149-157, 9 refs.

Ferret is a workstation-based visualization and analysis environment designed to meet the needs of physical scientists studying global ocean/climate interactions. Ferret provides a highly-automated, flexible, end-to-end environment in which can be probed large and complex gridded data sets, such as model outputs and observational data products, with little or no assistance from computer professionals. The design of Ferret has emphasized close integration of graphics, analysis, and data management. Ferret provides well-proven scientific graphics styles, such as contours, scatter plots, and vector diagrams, and the ability to define new variables as mathematical expressions involving database variables. Analysis is augmented by regridding capabilities and Boolean operators to perform calculations over arbitrary regions. Ferret's data management is based on a simple, adaptable data model integrated with standardized, self-describing, direct-access files. Pictorial examples of antarctic applications include southern elephant seal tracking displays in the waters around the Antarctic Peninsula, South Georgia, the Falkland Islands, Tierra del Fuego, and from 80°W to 20°E between 70° and 50°S. (Auth. mod.)

#### A-56505

Dodge, C., Majewski, F., Marx, B., Pfeiffenberger, H., Reinke, M., **Providing global access to marine data via the World Wide Web**, *Journal of visualization and computer animation*, July-Sep. 1996, 7(3), p.159-168, 7 refs.

This paper presents development work undertaken at the Alfred Wegener Institute for Polar and Marine Research to enable the distribution of scientific information over the WWW. One of the first projects was to provide an electronic version of the printed 'Hydrographic Atlas of the Southern Ocean'. The 'Southern Ocean' database is presented, the data from which was used for generation of the atlas graphics. This is followed by a discussion of some of the issues related to the creation on the electronic form of the atlas. One major database directly accessible on-line is the 'Ocean-Circulation Database', which comprises measured data from research vessel expeditions from 1985 on. The database itself is introduced, after which a description of the two methods of database query via a Web browser is given. If known, the name of a cruise can be input, or alternatively, one can click in the geographical area of interest on a 'clickable

image' map of the world. Each click zooms the user in to the area of interest until the separate measurement points can be resolved. The user can then directly interrogate the database by clicking on the points. (Auth.)

#### A-56506

Falcidieno, B., Orgolesu, S., Pizzi, C., Sanguineti, A., Spagnuolo, M., **High fidelity digital terrain modelling for the reconstruction of the antarctic sea floor**, *Journal of visualization and computer animation*, July-Sep. 1996, 7(3), p.177-187, 13 refs.

Shape-based modelling is a general approach to surface representation, which has a great importance in the specific context of the antarctic sea floor reconstruction, where measurements can involve critical operations. Here, a method is proposed where shape-based surface reconstruction is achieved performing a geometric reasoning on the raw data to delineate a shape structure on which the final surface model can be built. Data of the antarctic sea floor are collected by surveys carried out along parallel courses during which the depth of the sea is measured at almost regular intervals. The seabed is then represented by a set of profiles, corresponding to almost vertical cross sections. The surface reconstruction is performed in three steps. First, a shape-based simplification is carried out on the profiles, using a combination of the wavelet theory and the classical Douglas and Peucker algorithm. The second step consists of finding similarities in the morphology of adjacent profiles, which may suggest the presence of surface features, such as ridges and ravines. Finally, the deduced surface features are used to build a kind of skeleton on which the most appropriate triangulation can be constructed. (Auth.)

#### A-56525

Balzer, W., Loyola, D., Spurr, R., Zahn, C., **GOME data processing at DFD** [GOME-Datenferarbeitung beim DFD], *DLR-Nachrichten*, May 1996, No.82, p.48-54, In German.

#### DLC TL526.63D39a

GOME is a scanning spectrometer used to measure the backscattered radiation of the Earth as well as the solar radiant flux density with a high spectral resolution for a satellite-borne system. The use of GOME, the instrument, to study the stratospheric ozone layer is addressed, with emphasis on the data processing. Data measurements of stratospheric ozone from antarctic regions are included and discussed. (Auth. mod.)

#### A-56559

Alfred Wegener Institute for Polar and Marine Research, **Report 1994/1995**, Bremerhaven, Germany, Alfred Wegener Institute for Polar and Marine Research, 1996, 275p., Publications generated by the science programs during the reporting period are listed on p.236-265.

The aim of scientific work carried out by the Alfred Wegener Institute is to identify and describe the main physical, chemical and biological processes in the polar regions, and to assess their importance for the global environment. This leads to close interaction and cross-fertilization between field investigations and numerical modelling. The conclusions arrived at through field work form the basis for numerical modelling of scenarios. With the help of the latter, it is possible to describe natural and anthropogenic environmental changes, and to assess potential long-term impacts. The research topics currently addressed at the Institute are grouped into the following three major areas: the coupled ocean-atmosphere-cryosphere system, marine ecosystems and the sediments of the polar seas and their continental boundaries. These three general research fields are investigated by the various scientific sections, each of which is dedicated to a specific discipline.

#### A-56665

Johnston, M.E., **Polar tourism regulation strategies: controlling visitors through codes of conduct and legislation**, *Polar record*, Jan. 1997, 33(184), p.13-20, Refs. p.19-20.

Controlling visitor impacts in polar regions continues to be important in both the Antarctic and Arctic. Concerns relate to impacts on the physical environment, cultural heritage, and host communities or scientific bases, as well as a recognition that safety and liability are major issues for governments, commercial operators, and local populations. Strategies for controlling tourists include visitor and operator codes and formal legislation. This paper summarizes several approaches to visitor regulation in polar regions in order to illustrate the ways in which concerns about tourist



impacts are being addressed. Similar issues arise throughout the polar regions, although in some places a particular emphasis might indicate a specific area of concern for a community, region, nation, or segment of the tourism industry. This paper first describes regulation of tourist behavior and considers general issues of strategy effectiveness. Then it examines the approaches to visitor regulation used in the Antarctic and on Svalbard as examples that may be of use in the further development of strategies in the Arctic. (Auth. mod.)

#### A-56669

Dodds, K.J., **Antarctica and the modern geographical imagination (1918-1960)**, *Polar record*, Jan. 1997, 33(184), p.47-62, Refs. p.60-62.

This paper examines how different technologies of exploration and mapping transformed human understanding of the Antarctic in the period 1918-1960. In the aftermath of the 'heroic' expeditions, European and American governments began to invest considerable monies in support of national expeditions for the purpose of claiming and mapping the polar continent. The collection of practical geographical information during the inter-war period was overtaken by the advent of polar aviation and aerial mapping in the 1930s. The aeroplane and the aerial camera played key parts in expanding stores of knowledge about the continent and altering perceptions of place. Finally, the paper considers the 1955-1958 Trans-Antarctic Expedition (TAE). This venture was significant because it was widely understood to be the final chapter in the geographical and scientific assault on the Antarctic. The TAE was the high point of polar achievement. (Auth. mod.)

#### A-56671

Scientific Committee on Antarctic Research, **SCAR bulletin No.124, January 1997**, *Polar record*, Jan. 1997, 33(184), p.89-96.

This bulletin presents a list of the membership of SCAR subsidiary groups, providing names and addresses of members of the working groups in biology, geodesy and geographic information, geology, glaciology, human biology and medicine, physics and chemistry of the atmosphere, solar-terrestrial and astrophysical research, solid-earth geophysics, seals, environmental affairs and conservation, and global change and the Antarctic.

#### A-56679

Kiernan, V., **US ship comes to the rescue of Russian polar team**, *New scientist*, June 22, 1996, 150(2035), p.7.

The impoverished Russian antarctic research program has hit rock bottom. At Russia's Mirnyy base, 38 staff would now be on starvation rations had not a US research ship dropped off more than 3.5 tons of food. The Mirnyy base, on the coast of the Davis Sea, had almost run out of provisions when the research vessel *Nathaniel B. Palmer* arrived with the supplies on June 12. A Russian supply vessel had been delayed for several weeks because of problems with its engines. Fortunately, the *Nathaniel B. Palmer*, operated by the Denver company Antarctic Support Associates on behalf of the National Science Foundation (NSF), was in the area, taking measurements as part of the international World Ocean Circulation Experiment. The ship was supposed to follow the edge of the antarctic sea ice from South Africa to Australia. So dispatching it to Mirnyy was only a minor diversion, says Erick Chiang, acting deputy director of polar programs at NSF. (Auth. mod.)

#### A-56680

**Antarctica 3, South Africa 1**, *New scientist*, June 22, 1996, 150(2035), p.11.

South African physicists will return to Antarctica following the completion of their new base. Scientists from South Africa had overwintered on the continent since 1960, but they missed the last two winters after their base, SANAE III, was crushed under the accumulated weight of ice and snow. The first three SANAE bases were built on the ice shelf near the coast, where they were steadily buried at a rate of more than one meter per year. The new location and design of SANAE IV should ensure that it does not suffer the same fate. The base stands at the edge of a cliff on a rocky plateau 200 km inland. The building perches on stilts that are designed to prevent the buildup of sastrugi—the drifts of snow that accumulate on the windward side of structures in the Antarctic. (Auth. mod.)

#### A-56713

Baggeroer, P.A., Jezek, K.C., Hart, D.G., **Geophysical Data Management System**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.1, New York, Institute of Electrical and Electronics Engineers, 1996, p.145-147, 1 ref.

#### DLC QE33.2.R4I57 1996

The Geophysical Data Management System (GDMS) at the Byrd Polar Research Center of Ohio State University, is described. The GDMS provides an archive of data sets of satellite SAR images of Greenland and Antarctica. Data from the Radarsat Antarctic Mapping Project is to be included. Researchers may access the GDMS on the World Wide Web (WWW) at <http://polestar.mps.ohio-state.edu/gdms/GDMS.html>

#### A-56913

United Nations. General Assembly, **Question of Antarctica: State of the environment in Antarctica. Report of the Secretary-General**, *United Nations document*, Sep. 20, 1996, A/51/390, 35p., 9 refs.

The present report has been prepared in response to General Assembly resolution 49/80 of Dec. 15, 1994 on the question of Antarctica and, in particular, to paragraph 2 of that resolution, in which the Assembly calls for a report on the information supplied by the Antarctic Treaty Consultative Parties on their activities in Antarctica to be submitted to the General Assembly at its fifty-first session. The report also updates previous reports to the General Assembly on the state of the environment in Antarctica, providing a synopsis of some recent findings. The emphasis of the report is on environmental issues.

#### A-56914

Berkman, P.A., **Antarctic Science and Policy: Interdisciplinary Research Education (ASPIRE)**, *Ohio State University. Byrd Polar Research Center. Report*, 1997, BPRC No.13, 70p., Refs. p.57-70.

The purpose of the report is to illustrate an interdisciplinary approach for teaching Earth System Science Education (ESSE) through group decision-making activities. This educational approach has been applied successfully in an interdisciplinary capstone course on Antarctic Marine Ecology and Policy that has been taught at universities in the United States since 1982. In this course, each student becomes an "ambassador" to an Antarctic Treaty nation with the task of recommending a practical and clearly defined solution that would mitigate a specific human impact in the antarctic marine ecosystem. These solutions are discussed and refined in working groups throughout the course to create the formal recommendations that are debated at the end of the term in a Mock Antarctic Treaty Consultative Meeting. The effectiveness of this interdisciplinary activity in teaching ESSE courses is assessed with regard to several student case studies.

#### A-56915

Jezek, K.C., ed, Tipton-Everett, L., ed, **Managing the antarctic environment: from observations to policy. A workshop report**, *Ohio State University. Byrd Polar Research Center. Report*, 1995, BPRC No.12, 42p., Refs. p.34-35.

The workshop was convened at the Byrd Polar Research Center on July 10-12, 1995. The primary objectives of the workshop were to review the status of environmental policies currently applied to Antarctica, to identify key physical, chemical and biological variables that can serve as indicators of human impacts and to identify requirements that spaceborne sensors must meet to be usefully applied as antarctic environmental monitoring tools. An additional objective was to explore how remote sensing data must be manipulated in order to be useful to policy makers. Over 50 participants with expertise in antarctic policy, science, and commercial enterprises attended the meeting. This report summarizes the findings of eight panels which addressed policy issues, the marine and terrestrial environments, science support, tourism, human impact, and remote sensing. Major conclusions reached by the panels are discussed. (Auth. mod.)

#### A-56917

Santiago de Chile. Instituto Antártico Chileno, **Boletín Antártico**



**Chileno, Vol.15, No.2**, Nov. 1996, 44p., In Spanish. Refs. passim. For selected papers see A-56918 and A-56919.

Most articles of this bulletin describe celebrations carried out to commemorate anniversaries of important events, individuals and organizations, related to Chile's activities in Antarctica. The section covering international activities presents highlights of conventions and meetings dealing, mainly, with the protection of the antarctic environment. General news items deal briefly with the subglacial lake Vostok, and the honoring of several INACH members for their contributions in antarctic research.

#### A-56918

Torres N., D., Jorquera F., D., García R., M., Vallejos M., V., **Rescue of entangled fur seals on Livingston I.** [Liberación de lobos finos, *Arctocephalus gazella*, enmallados en cabo Shirreff e islotes San Telmo, isla Livingston, Antártica], *Boletín Antártico Chileno*, Nov. 1996, 15(2), p.7-10, In Spanish with English summary. 8 refs.

The release of 6 fur seals (*Arctocephalus gazella*), entangled in marine debris at Cape Shirreff and San Telmo I. in the summer of 1995-1996, is reported. Four animals had neck collars of plastic material (net pieces and strapping bands), and 2 had collars formed by the skin of penguins killed by leopard seals. The former, 2 juveniles and 2 pups 3-months old, provide evidence that fishing fleets and tourist ships continue discharging their litter into the open sea which, the authors point out, is contrary to international agreements for the prevention of marine pollution. (Auth. mod.)

#### A-56919

Aguayo Lobo, A., **Scientific research during the winter expedition** [Actividades científicas de la campaña de invierno], *Boletín Antártico Chileno*, Nov. 1996, 15(2), p.12-14, In Spanish with English summary. 4 refs.

Results of investigations during the first winter antarctic cruise, carried out in the Bransfield Strait by the AP-46 *Contralmirante Óscar Viel Toro* between June 2 and 22, 1996, are discussed. The average sea ice thickness was 48.9 cm, with a maximum of 220 cm, in the explored area. The zooplankton samples indicate that, in open waters, the dominant copepod genera are the *Oithona* and the *Metridia*. A few species of euphausiids were collected at night. The only species of penguin found in the Bransfield Strait was the Adélie; however, a number of gulls (*Larus*) and petrels (giant, antarctic, snow, fulmar and cape pigeon) were sighted. The principal species of marine mammals recorded were crabeater, leopard and Weddell seals, the antarctic fur seal, and minke whales. (Auth. mod.)

#### A-56920

Marine Mammal Commission, **Annual report to Congress, 1996**, Bethesda, MD, Marine Mammal Commission, 1997, 247p., Refs. p.239-247.

This is the 24th annual report to Congress of the Marine Mammal Commission and its Committee of Scientific Advisors on Marine Mammals. The Commission, established under Title II of the Marine Mammal Protection Act of 1972, provides policy and programmatic guidance to Congress, the Executive Branch and Federal agencies on domestic and international activities affecting marine mammal conservation. The section of this report pertinent to Antarctica (p.116-131) includes articles on the conservation and protection of marine mammals in the southern ocean, covering the whale sanctuary areas, the Protocol on Environmental Protection to the Antarctic Treaty, activities of the 20th and 21st Antarctic Treaty Consultative Meeting, tourism and non-governmental activities. Also covered are activities related to marine living resources, including environmental impact assessment and monitoring, the krill and finfish fisheries, and an outline of the U.S. Antarctic Marine Living Resources Research Program.

#### A-56937

Gilson, G., **Antarctica: mineral resources and environment** [Antarctique: ressources minérales et environnement], Brussels, CREADIF, 1992, 149p., In French. Refs. p.135-144.

DLC KWX825.G55 1992

This study centers on the Wellington Convention, June 2 1988, in the framework of the Antarctic Treaty System, and presents an analysis of the document's origin, of its different components, and of the controversies and debates created by it.

#### A-56938

Sand, P.H., **Lessons learned in global environmental governance**, *Boston College environmental affairs law review*, Winter, 1991, 18(2), p.213-277, 281 refs.

DLC K5.N83 1990-91

In the light of the Vostok core studies of atmospheric conditions and temperature changes in Antarctica, and the evidence of a clear and steep upward trend in atmospheric CO<sub>2</sub> concentrations, the growing institutional memory of managerial methods for coping with some typical obstacles to effective international environmental governance is discussed. Innovative international mechanisms, for environmental standard-setting and implementation directly related to some of the decision making ahead, are analyzed.

#### A-56960

Centro Ricerca e Documentazione Polare, Rome, **Polar news/Notizie polari, Vol.11, No.11**, 1996, p.64-70, In Italian and English.

The news items pertinent to Antarctica in this issue deal with the following: the drilling of the world's deepest and oldest ice core at Vostok Station; the recovery of the solar telescope that circled Antarctica and imaged sunspots in a survey of the causes of solar flares; the newly rebuilt Australian stations designed to enhance the living and working conditions of polar expeditioners; and the interaction of solar radiation with snow and ice surfaces in Antarctica and its effect on global climate

#### A-56961

Centro Ricerca e Documentazione Polare, Rome, **Polar news/Notizie polari, Vol.11, No.10**, 1996, p.57-63, In Italian and English.

The news items pertinent to Antarctica in this issue deal with the following: the postponement of the international drilling project at Cape Roberts; satellite monitoring of crabeater seals; plans for an advanced program to include antarctic stations in a wide medical teleconsulting network; crevasse detection with airborne radar; and access to the ocean by the use of a hot water drill to penetrate the ice shelf near the Georg von Neumayer Station.

#### A-56967

McDonald, K.A., **Preserving a priceless library of ice**, *Chronicle of higher education*, Aug. 2, 1996, p.A7, A11.

The National Ice Core Laboratory, built in 1993 by the National Science Foundation, the U.S. Geological Survey, and the University of Colorado at Boulder, maintains a repository of 13,000 ice cores collected from Greenland and Antarctica. The air temperature in the main ice storage area is kept at a constant -36°C. If the laboratory's main power fails, a generator is automatically turned on. If the compressor that cools the facility breaks, the replacement goes into service. If both the main power and the generator go out, a compressor that operates on natural gas switches on. If all else fails, thick insulation can keep the interior of the building at the proper temperature for 24 hours. Information on the ice cores is accessible on the World Wide Web at <http://instaar.colorado.edu/nicl/welcome.html>.

#### A-57029

Manzoni, M., **Italian activities in Antarctica, 1899-1986**, *Colonna di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, *Droit international de l'Antarctique/International law for Antarctica*. Edited by F. Francioni and T. Scovazzi, p.499-513, Refs. p.511-513.

DLC JX4084.A5I58 1987

This paper considers the following: Italians in Antarctica, 1899-1967; National Research Council Antarctic activities, 1968-1984; other Italian visits and expeditions, 1970-1985; and ENEA and the first national expedition, 1985-1986.



**A-57053**

Centro Ricerca e Documentazione Polare, Rome, **Polar news/Notizie polari, Vol.12, No.1**, 1997, p.1-7, In Italian and English.

The news items pertinent to Antarctica in this issue deal with the following: A European program, EPICA, of ice coring in Antarctica which began in Jan. 1996; the celebration at Scott Base of its 40th anniversary; and the crossing of Antarctica's 2829 km by the first man, ever, to achieve it alone and unsupported.

**A-57054**

Centro Ricerca e Documentazione Polare, Rome, **Polar news/Notizie polari, Vol.11, No.12**, 1996, p.71-77, In Italian and English.

The news items pertinent to Antarctica in this issue deal with the following: new technology and research techniques in marine and terrestrial geology and geophysics; a study in the Ross Sea of Antarctica's largest spring bloom of phytoplankton and its role in the carbon cycle; a study in the Weddell Sea of zooplankton and micronekton ecology to determine how changes in sea ice cover affect the animal populations; a network of instruments that take continuous measurements of aurora and the polar ionosphere; and cosmic dust particles found in ice and snow in the meteorite concentrated regions.

**A-57095**

Monastersky, R., **New station recommended for the South Pole**, *Science news*, Mar. 22, 1997, 151(12), p.175, See A-57096 or 51-3352, for a parallel report in *Science*, 175(5307):1732, Mar. 21, 1997.

The report tells of a strong endorsement by an independent review board, chaired by Norman Augustine, CEO of Lockheed Martin, of plans to rebuild the facility at Amundsen-Scott Station. The endorsement includes a \$20 million cut in funds over five years in science projects to help pay for the station refit.

**A-57096**

Mervis, J., **U.S. antarctic panel makes case for replacement station**, *Science*, Mar. 21, 1997, 275(5307), p.1732, See A-57095 or 51-3351 for a parallel report in *Science News*, 151(12):175, Mar. 21, 1997.

The report tells of a strong endorsement by a blue ribbon panel, chaired by Norman Augustine, CEO of Lockheed Martin, of plans to rebuild the facility at Amundsen-Scott Station. The endorsement includes a \$20 million cut in funds over five years in science projects to help pay for the station refit.

**A-57134**

Dey-Nuttall, A., **Profiles of national Antarctic operating agencies of Antarctic Treaty Consultative Parties: an introductory study**, *Polar record*, Apr. 1997, 33(185), p.133-144, 28 refs.

Each Antarctic Treaty Consultative Party established its national antarctic operating agency in circumstances that were unique to itself. For some of the original members of the Antarctic Treaty, the initial organizations have continued to act as their national antarctic operators. New members have either delegated responsibility to existing government organizations or have established new bodies to implement their national antarctic programs. The organizations selected to assume responsibility for operating the individual national antarctic programs, although varied, possess similar attributes and fall into 4 categories. The distinguishing features of these categories are based on the extent of the functions and financial responsibilities adopted by the agencies. By establishing their nature, this study offers a framework for analysis and a basis for further research on the styles and trends in organizing national antarctic programs. (Auth.)

**A-57135**

Scientific Committee on Antarctic Research, **SCAR bulletin No.125, April 1997**, *Polar record*, Apr. 1997, 33(185), p.167-182.

Activities of the 24th meeting of SCAR, held in Cambridge, United Kingdom, Aug. 12-16, 1996, are reviewed. The agenda included the presentation of summary reports of meetings of SCAR Subsidiary Groups, a

report of the Group of Specialists on SCAR strategy, a review of SCAR functions, outlines of XXIV SCAR 21 recommendations, and a report of the XXIV SCAR Finance Committee.

**A-57238**

Great Britain. Natural Environment Research Council, **Strategy for polar science 1995-2000**, Swindon, UK, Natural Environment Research Council, 1995, 61p., Append. 1 contains contact addresses for NERC affiliates and other institutions/organisations. Append. 2 is a list of acronyms and abbreviations.

The publication contains a statement of the British view of a polar research strategy, its relevance, programs, perceived science needs into the 21st century, and specific areas of needed research. The global nature of projected programs includes substantial commitment in both arctic and antarctic regions.

**A-57244**

British Antarctic Survey, **Antarctic science into the 21st century**, Cambridge, Natural Environment Research Council, Sep. 1995, 36p.

In undertaking a program of first class science through which an active and influential role can be sustained in the antarctic region, the British Antarctic Survey mission is viewed from these points of interest: background information concerning the Antarctic Treaty System and coordination in antarctic research; global change, including atmosphere-sea ice-ocean interactions; sustainable development in environmental protection; framework science; conservation and management; enabling technologies, such as platforms for advanced scientific research; strategy for NERC antarctic science programs other than those of BAS; and international collaboration. Two appendices include a list of contact addresses and a list of acronyms and abbreviations.

**A-57245**

British Antarctic Survey, **Report of the British Antarctic Survey 1995-96**, Cambridge, Natural Environment Research Council, [1996], 145p., Pubs. p.125-134.

After summarizing BAS year's important events and scientific discoveries, the highlighted topics are reported in more depth. The following is covered: logistics, BAS operational activities and central facilities; science activities, dealing with antarctic ice cover, climate and geological history, the structure and dynamics of the southern ocean ecosystem, dynamics of antarctic terrestrial and freshwater ecosystems, energy flow and dissipation in geospace, antarctic geographic information and mapping, and humans in isolated polar communities. Several appendices provide BAS' financial background, and lists of 1995 publications and staff in various locations, divisions and ships.

**A-57257**

New Zealand Antarctic Society, **Antarctic, Vol.14, No.4**, Christchurch, 1996, p.121-160.

The main news items covered in this issue deal with antarctic activities of New Zealand, United States, France, Australia, South Africa and Italy; an article on Scott Base 40 years ago; recent and old expeditions; education; tourism; book reviews and miscellaneous items.

**A-57262**

Bacigalupi, L., ed, Pignocchi, A., ed, **Italian National Antarctic Research Programme: list of publications 1995-1996**, Rome, ENEA - Antarctic Project, 1996, 56p.

This list of the Italian National Antarctic Research Programme publications (ANT 97/03), comprises papers by authors whose research projects were carried out within the framework of the Italian program. The references are arranged by 8 subject areas, based on the particular structure of the Italian research projects. Within each section, items are arranged alphabetically by the first author, followed by year of publication, title of the article, journal title, and volume number and pagination.

**A-57263**

Santiago de Chile. Comité Nacional de Investigación Antártica (CNIA), **Report to SCAR: Apr. 1, 1991-Mar. 31, 1992, No.33**, submitted by the National Committee on Antarctic Research



[Informe al SCAR: 1° de abril, 1991-31 de marzo, 1992, No.33, presentado por el Comité Nacional de Investigación Antártica], Santiago de Chile, 1991, 43p., In Spanish and English. Publications p.36-41.

This report to the Scientific Committee on Antarctic Research (SCAR), of the International Council of Scientific Unions (ICSU), prepared by the Comité Nacional de Investigaciones Antárticas (CNIA), is a summary of the scientific activities carried out by Chile in Antarctica, during the 1990-91 period, the ongoing program during 1991 and the planned activities proposed for the 1991-92 season. In parallel Spanish and English texts, details of the programs are outlined in biology, human biology and medicine, geology, hydrography/oceanography, atmospheric science, meteorology and logistics.

#### A-57264

Antarctic Society of Australia, **Newsletter, No.48, Mar. 1997**, Pymble, New South Wales, 1997, 20p.

This issue opens with comments on the effects of global warming in Antarctica, including concern for the retreat of ice shelves and evidence of climatic change. It continues with a note in memory of Sir Douglas Mawson and plans to restore his historic hut; short reports on walking expeditions across the ice; American and Australian aid to the Russians at Mirny Station; whale killing legislation; a volcanic eruption at Heard I.; and ANARE miscellaneous news, including a list of forthcoming events.

#### A-57289

Dingwall, P.R., ed, Walton, D.W.H., ed, SCAR/IUCN Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993, **Opportunities for antarctic environmental education and training. Proceedings, Conservation of the Southern Polar Region**, 1996, No.3, 174p., Refs. passim. For selected papers see A-57290 through A-57304.

**DLC GE90.A6S33**

This volume contains papers presented at the SCAR/IUCN Workshop on Environmental Education and Training, held in Gorizia, Italy, on April 26-29, 1993. The papers are grouped in 6 chapters headed as follows: Legal and policy requirements for antarctic environmental education and training; formal education on Antarctica and its conservation; education and training for scientists and support staff of national antarctic programmes; education for antarctic visitors; public education on Antarctica and its conservation; and conclusions. The volume begins with a summary of discussion and recommendations, and ends with a list of participants.

#### A-57290

Richardson, M.G., **Environmental education and training in the Antarctic: legal and policy issues, Conservation of the Southern Polar Region**, 1996, No.3, SCAR/IUCN Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993. Opportunities for antarctic environmental education and training. Proceedings. Edited by P.R. Dingwall and D.W.H. Walton, p.5-15.

**DLC GE90.A6S33**

This paper addresses the legal and policy issues related to environmental protection and conservation in Antarctica. It identifies the obligations for environmental education and training required by the Antarctic Treaty System (ATS), assesses how effective the dissemination of information and training has been, and makes recommendations that would enhance implementation of the Environmental Protocol.

#### A-57291

Dingwall, P.R., **Environmental education and training for visitors to islands of the Southern Ocean, Conservation of the Southern Polar Region**, 1996, No.3, SCAR/IUCN Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993. Opportunities for antarctic environmental education and training. Proceedings. Edited by P.R. Dingwall and D.W.H. Walton, p.17-25, 6 refs.

**DLC GE90.A6S33**

In the southern ocean, beyond the Antarctic Treaty Area, are some 17 major oceanic islands and island groups. They are administered as the sovereign territory of six nations: Australia, New Zealand, South Africa, France, Norway and the United Kingdom. This paper provides a guide to the complex field of environmental management of the islands involving at least 6 different legal systems.

#### A-57292

Davis, B., **Formal education on Antarctica and its conservation: Australasian, UK and US initiatives, Conservation of the Southern Polar Region**, 1996, No.3, SCAR/IUCN Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993. Opportunities for antarctic environmental education and training. Proceedings. Edited by P.R. Dingwall and D.W.H. Walton, p.31-38.

**DLC GE90.A6S33**

This paper provides a brief initial exploration of needs, opportunities and experience in higher education for antarctic environmental management. No comprehensive survey currently exists to identify needs or the availability of appropriately trained personnel to plan and implement requirements of the Madrid Protocol.

#### A-57293

Valencia, J., Acero, J.M., Fanta, E., **Formal education and training in Chile, Argentina and Brazil, Conservation of the Southern Polar Region**, 1996, No.3, SCAR/IUCN Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993. Opportunities for antarctic environmental education and training. Proceedings. Edited by P.R. Dingwall and D.W.H. Walton, p.39-45.

**DLC GE90.A6S33**

Antarctic formal education and training experiences of three Latin American countries are described: their objectives, resources, structure and short-term projections.

#### A-57294

Jackson, A., **Australian approach to Antarctic environmental education, Conservation of the Southern Polar Region**, 1996, No.3, SCAR/IUCN Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993. Opportunities for antarctic environmental education and training. Proceedings. Edited by P.R. Dingwall and D.W.H. Walton, p.51-55.

**DLC GE90.A6S33**

This paper outlines some of the methods currently in place to ensure that Australian antarctic expedition personnel receive appropriate education in protection of the environment. The methods are not described in detail and do not appear in order of priority. The paper does not attempt to cover the environmental education role that the Australian Antarctic Division has in the broader community, for which there is wide ranging involvement in public relations and education programs.

#### A-57295

Tate, R.B., **Training in environmental conservation and management and waste disposal in the Antarctic by the British Antarctic Survey, Conservation of the Southern Polar Region**, 1996, No.3, SCAR/IUCN Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993. Opportunities for antarctic environmental education and training. Proceedings. Edited by P.R. Dingwall and D.W.H. Walton, p.57-65, 5 refs.

**DLC GE90.A6S33**

This paper identifies some of the ways in which people have impact on the antarctic environment and explains the measures adopted by the British Antarctic Survey to minimize these impacts. The dissemination of information and the effectiveness of this strategy are examined. Areas of specialist training are also considered and recommendations are made for improving the scope and form of the training.

#### A-57296

Splettstoesser, J., **Education of visitors to Antarctica, Conservation of the Southern Polar Region**, 1996, No.3, SCAR/IUCN



Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993. Opportunities for antarctic environmental education and training. Proceedings. Edited by P.R. Dingwall and D.W.H. Walton, p.75-86.

**DLC GE90.A6S33**

A key ingredient of any tour-ship cruise to Antarctica is an educational program that is designed to inform passengers as fully as possible of the abundance and vulnerability of wildlife and other physical aspects of the tours. The widely publicized Guidelines for Visitors are repeatedly referred to in briefings during the cruises, and experienced naturalists/lecturers provide onboard lectures and guide all tours ashore.

**A-57297**

Naveen, R., **Proposals for a revisited Code of Guidance for Antarctic Visitors**, *Conservation of the Southern Polar Region*, 1996, No.3, SCAR/IUCN Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993. Opportunities for antarctic environmental education and training. Proceedings. Edited by P.R. Dingwall and D.W.H. Walton, p.87-99.

**DLC GE90.A6S33**

The purpose of the revised 'Code of Guidance for Antarctic Visitors' is to provide guidance that assists efforts of antarctic visitors to ensure that their activities comply with the general principles and obligations of the Protocol and its Annexes, by following a simple set of guidelines. These guidelines apply to all visitors, including station personnel, scientists, support staff, and all personnel involved in any non-governmental expeditions to Antarctica, whether by ship, yacht or aircraft. The text of the 8 parts of the guidelines is presented.

**A-57298**

Simpson, P.G., **Principles of environmental education**, *Conservation of the Southern Polar Region*, 1996, No.3, SCAR/IUCN Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993. Opportunities for antarctic environmental education and training. Proceedings. Edited by P.R. Dingwall and D.W.H. Walton, p.109-112.

**DLC GE90.A6S33**

As background to the wide range of discussions on educational issues and activities, it is important first to understand the principles and characteristics of Environmental Education (EE). In this paper, the key points from an authoritative definition of EE are examined and specific features relating to Antarctica are identified.

**A-57299**

Johnston, L., **Role of visitor centres: a case study of the Visitor Centre, International Antarctic Centre, Christchurch, New Zealand**, *Conservation of the Southern Polar Region*, 1996, No.3, SCAR/IUCN Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993. Opportunities for antarctic environmental education and training. Proceedings. Edited by P.R. Dingwall and D.W.H. Walton, p.113-123.

**DLC GE90.A6S33**

In Sep. 1991 a Visitor Centre opened as part of the International Antarctic Centre in the City of Christchurch, New Zealand. As a case study of the role of visitor centers in antarctic education and training, this paper outlines the Centre's origins, its philosophy and purpose, and summarizes its marketing, publicity and education programs.

**A-57300**

Bonner, W.N., **Museums and the Antarctic**, *Conservation of the Southern Polar Region*, 1996, No.3, SCAR/IUCN Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993. Opportunities for antarctic environmental education and training. Proceedings. Edited by P.R. Dingwall and D.W.H. Walton, p.127-134.

**DLC GE90.A6S33**

The role of museums in general, and museums in the Antarctic in particular, is discussed. The South Georgia Whaling Museum at Grytviken is described and its uniqueness in the antarctic region, as an interpretative center for the antarctic whaling industry, is pointed out.

**A-57301**

Mills, W.J., **Public education and Antarctica: the role of libraries**, *Conservation of the Southern Polar Region*, 1996, No.3, SCAR/IUCN Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993. Opportunities for antarctic environmental education and training. Proceedings. Edited by P.R. Dingwall and D.W.H. Walton, p.135-144, 4 refs.

**DLC GE90.A6S33**

It is pointed out that a literature survey reveals little written specifically about the role of libraries in relation to Antarctica, despite the importance attached by the Antarctic Treaty to the exchange of scientific information (Article III) and recommendations at Consultative Meetings concerning public accessibility of documents relating to the Antarctic Treaty System. This paper begins with a brief overview of antarctic library collections, going on to outline potential information services which might, on the basis of such collections, be developed by libraries prepared to adopt a more active role in relation to public education. Several recommendations are included.

**A-57302**

Sitwell, N., **Role of the media in educating the public about Antarctica**, *Conservation of the Southern Polar Region*, 1996, No.3, SCAR/IUCN Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993. Opportunities for antarctic environmental education and training. Proceedings. Edited by P.R. Dingwall and D.W.H. Walton, p.145-148.

**DLC GE90.A6S33**

This paper discusses 4 kinds of media that could play an important role in educating the public about Antarctica: newspapers, radio, magazines and television. A summary of the key principles in using the media is presented.

**A-57303**

Walton, D.W.H., **Role of publishing in information dissemination**, *Conservation of the Southern Polar Region*, 1996, No.3, SCAR/IUCN Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993. Opportunities for antarctic environmental education and training. Proceedings. Edited by P.R. Dingwall and D.W.H. Walton, p.149-154.

**DLC GE90.A6S33**

It is pointed out that publishing is traditionally thought of as the activity of commissioning, printing and marketing books. At the end of the 20th century publishing is changing, and this paper draws together some comments on the much wider remit of modern publishers: not only books, but also magazines and journals, maps, charts, posters and postcards, 'grey' literature and electronic publishing, including compact disks and videos.

**A-57304**

Marks, B., **Public education and the role of non-governmental organisations**, *Conservation of the Southern Polar Region*, 1996, No.3, SCAR/IUCN Workshop on Environmental Education and Training, Gorizia, Italy, 26-29 April 1993. Opportunities for antarctic environmental education and training. Proceedings. Edited by P.R. Dingwall and D.W.H. Walton, p.155-161.

**DLC GE90.A6S33**

Non-governmental organizations' (NGO) involvement in environmental education in general, and The Antarctic Project approach to antarctic education in particular, are described. Future prospects and plans, and requirements to improve NGO performance, are outlined.

**A-57326**

ANARE Club, **Aurora, Mar. 1997, Vol.16, N.3**, Melbourne, 1997, 28p.

The articles and news items in this issue deal with the following: an outline of what will be the main issues influencing Australian antarctic science for the first 20-25 years of the next millenium; comments on activities and programs on Macquarie I. that are currently taking place and in progress over the past 50 years; an account of the Australian expedition to Macquarie I. in 1948; a report by an ANARE Club representative who participated in Voyage 4, 1996-1997, visiting all 4 Australian stations and



supplying assistance to Russian and Chinese stations; letters to the editor; photographs of art work representing the Australian antarctic husky memorial; the contents and size of ANARE field ration packs, in which economy of weight and space is a primary consideration; Mawson Station to be part of an international nuclear monitoring network; book reviews and ANARE miscellaneous new items.

#### A-57327

Elliott, L.M., **Environmental protection in the Antarctic: problems and prospects**, *Environmental politics*, Summer 1994, 3(2), p.247-272, Refs. p.269-272.

**DLC GE170.E577 1994**

It is pointed out that the Antarctic Treaty of 1959 is almost silent on the issue of environmental protection, and that it was not until 1991 that the Treaty parties agreed to a comprehensive and integrated set of rules in the Protocol on Environmental Protection—the Madrid Protocol. It is agreed that while the Madrid Protocol holds out the promise of better protection of the antarctic environment, it is still subject to flaws, is not yet in force, and will continue to rely on the political will of the Treaty parties to put its rules into practice.

#### A-57328

Harrowfield, D.L., **Icy heritage: the historic sites of the Ross Sea Region, Antarctica**, Christchurch, Antarctic Heritage Trust, 1995, 88p., 20 refs.

**DLC G890.R63H28 1995**

In 1987 the Antarctic Heritage Trust was established in New Zealand to co-ordinate the restoration and on-going protection of the historic sites in the Ross Sea region and to raise funds for this purpose. This book records, and describes, 34 sites which are listed in the Antarctic Heritage Trust Conservation Plan. Most are located in coastal areas from Cape Adare to McMurdo Sound and on Ross I. Some have not been visited since they were originally abandoned. Numerous photographs accompany the text.

#### A-57371

Spain. Comisión Interministerial de Ciencia y Tecnología. Comité Nacional Antártico, **Annual report to SCAR, No.8, on Spanish antarctic activities, 1995-1996, and planned programs** [Informe anual al SCAR sobre las actividades científicas españolas en la Antártida. Campaña 1995-1996 y nuevos proyectos previstos], Madrid, July 1996, var. p., 100 refs.

The report begins by listing Spanish antarctic stations, providing their names, locations, and coordinates. Automatic recording stations/observatories are also listed, with identifying number, coordinates and parameters recorded. This is followed by outlines of projects carried out from July 1, 1994 to June 30, 1995, and those proposed for the period 1996-1999, covering numerous disciplines. The outlines include the subject, type, locality, and duration of the investigations, as well as the names and addresses of principal investigators.

#### A-57372

Italy. Ministry for Universities and Scientific and Technological Research. Italian National Scientific Commission for Antarctic Research, **Italy antarctic research report to SCAR, June 1996. 1. July 1, 1995-June 30, 1996, record of activities. 2. July 1, 1996-June 30, 1997, planned activities**, Rome, June 1996, 15p. + appendix p.I-VIII.

The report begins by giving the name, location and coordinates of the Italian antarctic station at Terra Nova Bay, and by listing the Italian automatic recording stations/observatories, with identifying name, number, coordinates, elevation and parameters recorded. This is followed by outlines of projects carried out from July 1, 1995 to June 30, 1996, and those planned for July 1996-June 1997, covering numerous disciplines. The outlines include the subject, type, locality, and duration of the investigations, as well as the names and addresses of principal investigators.

#### A-57373

Ecuadorian Antarctic Program, **Annual SCAR report on national antarctic scientific activities, 1 July 1995-30 June 1996**, Quito, 1996, 8p.

The report begins by giving the name, location, and coordinates of Ecuador's antarctic station. This is followed by outlines of projects carried out from July 1, 1995 to June 30, 1996, in geodesy and geographic information, and programs planned for 1996-1997, in the above field, as well as in human biology and medicine, physics and chemistry of the atmosphere, marine chemistry, and environmental research. The outlines include the subject, type, locality and duration of the investigations, as well as the names and addresses of principal investigators.

#### A-57374

New Zealand. Standing Committee on Antarctic Research, **Annual SCAR report on national antarctic scientific activities, 1 July 1995-30 June, 1996**, Wellington, 1996, 9p.

The report begins by listing New Zealand antarctic stations, providing their names, location and coordinates. Automatic recording stations/observatories are also listed, with identifying name, coordinates, and parameters recorded. This is followed by outlines of projects carried out from July 1, 1995 to June 30, 1996, and those proposed for the period 1996-1997, covering numerous disciplines. The outlines include the subject, type, locality and duration of the investigations, as well as the names and addresses of principal investigators.

#### A-57375

Japanese National Committee on Polar Research, **Annual SCAR report on national antarctic scientific activities, 1 July 1994-30 June 1995**, Tokyo, 1995, 12p.

The report begins by listing Japanese antarctic stations, providing their names, location and coordinates. Automatic recording stations/observatories are also listed, with identifying name, coordinates, and parameters recorded. This is followed by outlines of projects carried out from July 1, 1994 to June 30, 1995, and those proposed for the period 1995-2001, covering numerous disciplines. The outlines include the subject, type, locality and duration of the investigations, as well as the names and addresses of principal investigators.

#### A-57376

Argentina. Dirección Nacional del Antártico, **Annual SCAR report on Argentine antarctic scientific activities, 1 July 1995-30 June 1996, and planned new programmes. Progress report No.38**, Buenos Aires, June 1996, 25p.

The report begins by listing Argentine antarctic stations, providing their names, location, and coordinates. Automatic recording stations/observatories are also listed, with identifying name, coordinates, and parameters recorded. This is followed by outlines of projects carried out from July 1, 1995 to June 30, 1996, and those planned for 1997, covering numerous disciplines. The outlines include the subject, type, locality and duration of the investigations, as well as the names and addresses of principal investigators.

#### A-57377

Ecuador. Programa Antártico Ecuatoriano, **Annual exchange of information to the Antarctic Treaty, 1993, under Articles III(1) and VII(5). Modifications to the plan 1992-1993. Activities plan 1993-1994** [Intercambio anual de información al Tratado Antártico, 1993, bajo los Artículos III(1) y VII(5). Modificaciones al plan 1992-1993. Plan de actividades 1993-1994], Guayaquil, Instituto Oceanográfico de la Armada, June 1993, 19p., In Spanish and English.

As exchanged information on Ecuador's planned activities for 1993-1994, the items covered include: boat's description; logistics, itinerary and activities of expeditions; names, coordinates, and opening dates of Ecuador's antarctic station and refuge; names, occupation, location and duration of stay of summer personnel; research projects and equipment; transportation and communication equipment; and housing and medical facilities, for rendering assistance, at Pedro Vicente Maldonado Station and the refuge "República del Ecuador".

#### A-57378

New Zealand: Ministry of External Relations and Trade. United Kingdom: Foreign and Commonwealth Office, **Antarctic Treaty: Report of a joint inspection under Article VII of the Antarctic**



**Treaty by New Zealand and United Kingdom observers, January 1989, Wellington, Apr. 1989, 55p.**

In the light of the discussions at the 14th Antarctic Treaty Consultative Meeting about the inspection provisions of Article VII of the Antarctic Treaty, the United Kingdom and New Zealand each designated three observers to undertake an inspection. The joint team visited 11 stations in the South Shetland Is., the Antarctic Peninsula and the South Orkney Is., between Jan. 5-20, 1989. In the same period the New Zealand observers inspected three United Kingdom stations on which a separate report will be issued. Following discussions with the station commander and his staff, the team inspected station facilities. The focus was on environmental questions such as procedures for the disposal of waste and protection of antarctic flora and fauna and the general issue of the concentration of stations in Antarctica. The report on each station sets out in summary form the central considerations as the team saw them.

**A-57379**

**Antarctic Treaty: Inspection report by New Zealand observers, Jan. 1989, 16p., Unpublished manuscript.**

Three observers designated by New Zealand in accordance with Article VII of the Antarctic Treaty undertook an inspection of stations in the Antarctic Peninsula area in Jan. 1989. They travelled with three observers designated by the United Kingdom. The New Zealand observers also inspected, separately, three British stations during their time in Antarctica. The stations were Rothera, Faraday and Signy. The following is the report of the New Zealand inspection of those three stations.

**A-57388**

Basberg, B.L., ed, Ringstad, J.E., ed, Wexelsen, E., ed, **Whaling and industry: perspectives on the evolution of the industry. Publication No.29, Sandefjord, Norway, Sandefjordmuseene, 1993, 214p., Refs. passim. For selected papers see A-57389 through A-57392.**

**DLC SH383.W48 1993**

In this book fifteen leading whaling historians present new research on the cultural, social, political and economic history of whaling. Although the book starts out with two chapters on medieval and one on American nineteenth century whaling, the so called "modern whaling" is the main theme. Several chapters explore phases in the development towards Antarctica round 1900. The political aspects of modern whaling is in focus in a chapter on the geographical discoveries in Antarctica by the whalers. A cultural aspect of the history is focused on in a chapter on the photographs the whalers have left behind.

**A-57389**

Basberg, B.L., **Survival against all odds? Shore station whaling at South Georgia in the pelagic era, 1925-1960, Whaling and history: perspectives on the evolution of the industry. Publication No.29. Edited by B.L. Basberg, J.E. Ringstad and E. Wexelsen, Sandefjord, Norway, Sandefjordmuseene, 1993, p.157-167, Refs. p.166-167.**

**DLC SH383.W48 1993**

From the beginning of antarctic whaling both shore stations and floating factory ships were in use. In the first 20 years, up until around 1925, shore station whaling was technologically superior. The ships could move from one catching ground to another, but they were dependent on sheltered waters where the whales could be flensed alongside and where they could find fresh water for the cooking operations. In reality, both the ships catching in South Georgia and South Shetland waters operated in ways similar to the shore stations, but with more disadvantages. From about 1925, the development in antarctic whaling took a new direction with the gradual introduction of pelagic whaling due to new innovations like the hauling-up slipway, increased ship sizes, evaporators which produced fresh water, more cost efficient cookers, separators and centrifugal machines which could separate the whale oil even in rough seas. From this time on, the shore station whaling gradually became less important. South Georgia was no longer the center of the whaling industry.

**A-57390**

Dickinson, A.B., **Some aspects of Japanese whaling and sealing in South Georgia, Whaling and history: perspectives on the evolution of the industry. Publication No.29. Edited by B.L. Basberg, J.E. Ringstad and E. Wexelsen, Sandefjord, Norway, Sandefjordmuseene, 1993, p.169-175, 29 refs.**

lution of the industry. Publication No.29. Edited by B.L. Basberg, J.E. Ringstad and E. Wexelsen, Sandefjord, Norway, Sandefjordmuseene, 1993, p.169-175, 29 refs.

**DLC SH383.W48 1993**

Japanese antarctic whaling began in the 1933-34 season with the voyage of *Tonan Maru*, previously the Norwegian factory ship *Antarctic*. The Japanese were able to resume whaling in the 1946-47 season with two tankers converted into the factory ships *Hashidate Maru* and *Nisshin Maru*. Japan joined the International Whaling Commission (IWC) in 1951, and began to expand her fleet by acquiring vessels from other nations. Japanese whaling companies began to express interest during the early 1960s in operating from South Georgia shore stations, including to obtain whale meat and seal oil. The brief Japanese presence heralded the end of some fifty-five years of regulated whaling and sealing on South Georgia.

**A-57391**

Barr, S., **Norwegian antarctic whaling seen through the eye of the camera, Whaling and history: perspectives on the evolution of the industry. Publication No.29. Edited by B.L. Basberg, J.E. Ringstad and E. Wexelsen, Sandefjord, Norway, Sandefjordmuseene, 1993, p.177-189, 14 refs.**

**DLC SH383.W48 1993**

The Norwegian antarctic whaling epoch covered the period from 1904 to 1968. In terms of the history of photography, this means that amateur photography was possible during the entire period, for the first 15-20 years as a more or less exclusive business or hobby, from the 1920s to 1950 limited almost entirely to black and white, and after 1950 also with the possibility of color.

**A-57392**

Headland, R.K., **Geographical discoveries in Antarctica by the whaling industry, Whaling and history: perspectives on the evolution of the industry. Publication No.29. Edited by B.L. Basberg, J.E. Ringstad and E. Wexelsen, Sandefjord, Norway, Sandefjordmuseene, 1993, p.191-202, 21 refs.**

**DLC SH383.W48 1993**

Whalers were responsible for discovering many coastal regions of Antarctica, especially in the 1930-31 season, described in this paper. The two latest periods, that of 'Permanent stations' (1943 to 1958) and the 'Treaty period' (1959-current) were also influenced by the whaling industry—especially with the consolidation of many national interests in Antarctica. It is the 'Whaling period', predominant from about 1919 to 1942 but active from the beginning of this century until the 1970s, that the author refers to in this paper.

**A-57487**

Wand, U., ed, **Studies of the AWI Research Department Potsdam in Antarctica, 1994-1995 [Arbeiten der AWI-Forschungssstelle Potsdam in Antarktika, 1994-1995], Berichte zur Polarforschung, 1996, No.215, 142p., One report in English, four in German. 70 refs.**

This report comprises two extended and three short reports. The first report (G. Schwarz) is the account of the first German to participate in a Japanese Antarctic Research Expedition. It centers on deuterium in polar air moisture. The second report (U. Wand, et al) focuses on geological sediments in the Schirmacher Hills region. The third report (W. Karth) provides an update of a geodetic net also in the Schirmacher Hills area. Report four (D. Fritzsche) deals with gravity measurements in the Coastal area of the Schirmacher Hills and along the routes of three earlier traverses. The last report (W.-D. Hermichen) gives an account of the investigations of Shackleton Range during the Euroshack Expedition, Nov. 1994-Mar. 1995.

**A-57490**

Walker, T.R., Reid, K., Arnould, J.P.Y., Croxall, J.P., **Marine debris surveys at Bird Island, South Georgia 1990-1995, Marine pollution bulletin, Jan. 1997, 34(1), p.61-65, 22 refs.**

Over the period 1990-95, surveys were conducted to determine the marine debris on one specific beach at Bird I., South Georgia. All debris were classified into one of four main categories: nylon line, polypropylene



packaging bands, polythene bags, and miscellaneous items. Results showed that, during all years, the number of items collected during the winter was greater than during the summer. Overall, 76% of all items were pieces of synthetic line, which were identical to that used in commercial long-line fishing operations, followed by packaging bands and polythene bags. The source of much of the contamination was local fisheries. (Auth. mod.)

#### A-57494

Belgian National Committee on Antarctic Research, **Annual SCAR report on national antarctic scientific activities, 1 July 1995-30 June 1996**, Brussels, Belgium, Royal Academy of Belgium, Dec. 1996, 8p.

Outlines of projects carried out by working groups from July 1995 to June 1996, and those planned for 1997-2000, are presented. The outlines, covering multiple disciplines, include the locality and duration of the investigations, as well as the names and addresses of principal investigators. A list of contact addresses concludes the report.

#### A-57495

Uruguayan Antarctic Institute, **Annual SCAR report on national antarctic scientific activities, 1 April 1995-30 June 1996**, Montevideo, Uruguay, 1996, 8p.

The report begins by listing Uruguay's antarctic station, its name, location and coordinates, and the name/identifier, coordinates and parameters recorded of its automatic recording station. This is followed by outlines of projects carried out in biology, atmospheric physics and chemistry, geodesy and human biology in 1995-1996, and planned projects for 1997, with subject, type, location and duration of the investigations and names and addresses of principal investigators. A list of contact addresses concludes the report.

#### A-57496

Australian National Committee on Antarctic Research, **Annual SCAR report on national antarctic scientific activities, 1 July 1995-30 June 1997**, Kingston, Tasmania, Australian Antarctic Division, 1996, 33p.

The report begins by listing Australian antarctic stations, providing their names, location and coordinates. Automatic recording stations/observatories, with identifying names and coordinates, and automatic weather stations and drifting buoys, with site name, coordinates, and satellite number, are also listed. This is followed by outlines of projects carried out in 1995-1996, and those planned for 1996-1997, covering numerous disciplines. The outlines include the subject, location and duration of the investigations, as well as the names and addresses of principal investigators. A list of contact addresses concludes the report.

#### A-57524

Score, R., **Search for meteorites yields returns in Antarctica**, *Earth in space*, Jan. 1997, 9(5), p.12-14.

The purpose of the Antarctic Search for Meteorites project, which is supported by the National Science Foundation is to collect as many meteorites in the Antarctic as can be found during the antarctic summer season. In addition to harvesting areas already known to be rich in meteorites, part of each field season is spent searching for new recovery areas. All of the searching is done from remote field camps that are isolated from civilization. NASA and the Smithsonian Institution are partners in supporting the distribution of the meteorites to scientific laboratories worldwide. The program was conceived by William A. Cassidy of the University of Pittsburgh after a team of Japanese geologists discovered meteorites in Antarctica in 1969. To date, this program has collected over 8,000 meteorite fragments, more than doubling the number of meteorites recovered on Earth, and it has provided research specimens to over 300 groups of scientists in 24 countries. (Auth. mod.)

#### A-57525

**Science "season" in Antarctica**, *Geotimes*, Feb. 1997, 42(2), p.6-7.

Antarctic's austral spring and summer seasons, when temperatures are at their highest for the year provide a few precious months for scientists from around the world to return to the frigid continent for continued study. Most research projects will conclude by the end of this month as the conti-

nent moves into its cold-weather season. The National Science Foundation is supporting approximately 145 projects, based primarily on two research vessels and at three land-based sites (McMurdo Station on Ross I., Amundsen-Scott South Pole Station, and Palmer Station on the Antarctic Peninsula). Many of these projects focus on Antarctica's unique geological characteristics. (Auth. mod.)

#### A-57537

Gladysheva, O.G., Kocharov, G.E., **On the integrated investigations of the astrophysical atmosphere and geophysical phenomena**, *Journal of geomagnetism and geoelectricity*, 1996, 48(9), p.1197-1199, 7 refs.

The purpose of this paper is to stress the importance of collaborative research using natural archives of the cosmogenic nuclei and of the nitrates generated in the Earth's atmosphere. Measurements of the nitrate abundance in ice cores in polar regions open a new possibility of receiving information on the solar activity for hundreds and thousands of years in the past. In the paper of Dreschhoff and Zeller (1994), a correlation is found between the precipitation of the nitrates and the flux of solar flare protons. For example, a clear increase of the nitrate abundance was detected during the solar flare in Aug. 1972, in the ice cores of both Greenland and Antarctica. (Auth. mod.)

#### A-57553

Richards, P., Fannin, N., Rendell, P., **Seismic, drilling committed on tracts off Falkland Islands**, *Oil and gas journal*, Dec. 23, 1996, 94(52), p.111-113, 4 refs.

In late October 1996 seven new production licenses for oil exploration in the Falkland Islands area were awarded in the first round, covering 12,800 km<sup>2</sup> in the North Falklands basin, an area equivalent to 48 UK North Sea blocks. The successful bidders have committed seven firm exploration wells for the first five year period and four more for the second exploration phase. A concise description of the Falkland Islands geology is set forth in the last half of the paper.

#### A-57645

Codling, R., **Antarctic paintings of Edward Seago (1910-1974)**, *Polar record*, July 1997, 33(186), p.213-222, 15 refs.

The professional artist Edward Seago (1910-1974) travelled to the Antarctic Peninsula, the Falkland Is., and South Georgia in the 1956/57 austral summer. He went to Antarctica with a firmly established skill in using oils to capture the essence of a landscape, producing about 18 oil paintings. In addition, he painted at least a further 17 works of the Falkland Is., South Georgia, the whaling industry, and icebergs in the southern ocean. Some of the paintings are shown and discussed, and a catalogue of his known antarctic works is given. (Auth. mod.)

#### A-57649

Scientific Committee on Antarctic Research, **SCAR bulletin No.126, July 1997**, *Polar record*, July 1997, 33(186), p.261-280.

This issue of the Bulletin contains summary reports to the XXIV SCAR meeting at Cambridge, United Kingdom, in August 1996. The reports were presented by working groups on biology, geodesy and geographic information, geology, glaciology, human biology and medicine, atmospheric physics and chemistry, solar-terrestrial and astrophysical research, and solid-earth geophysics. Included are recommendations in each discipline represented by the working groups.

#### A-57785

Greaves, P.M., **Ill-fated James Murray**, *Quekett journal of microscopy*, Autumn 1996, 37(8), p.606-620, 18 refs.

James Murray (1865-1914) was one of the most prolific workers on the fauna of mosses and sediments in the early 20th century. In particular, he became known for his contributions to tardigrade and bdelloid rotifer science, describing 113 species and varieties of rotifer and 66 species of tardigrade. He accompanied Ernest Shackleton to the Antarctic as expedition biologist; upon his return, he prepared the Reports on the Scientific Investigations for the British Antarctic Expedition. (Auth. mod.)

#### A-57812

Atkinson, K.B., **Antarctic connexions**, *Survey review*, July 1997,



34(265), p.188-190, 2 refs.

The names of ten former staff and students of the Department of Photogrammetry and Surveying, University College London have been ascribed to antarctic place-names. Two names are in the Ross Dependency (New Zealand) and the remainder in the British Antarctic Territory including one in South Georgia. This article records details of the men and of the physical features which carry their names. (Auth.)

#### A-57818

Cacho, J., ed, Serrat, D., ed, **Spanish Symposium on Antarctic Studies, 5th. Proceedings** [Actas del V Simposio Español de Estudios Antárticos], Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], 502p., In Spanish with English summary. Refs. passim. For individual papers see A-57853, B-57819, B-57821 through B-57826, C-57844, E-57833 through E-57839, F-57840 through F-57843, G-57854 through G-57859, I-57845 through I-57847, J-57820, J-57848 through J-57852, and L-57827 through L-57832.

This is a collection of 41 papers presented at the 5th symposium on Spanish antarctic activities, reporting results of investigations conducted by Spanish scientists, sometimes in collaboration with scientists from other countries, during various antarctic expeditions, mostly in the region of the South Shetland Is. The papers are representative of various fields of interest, which cover biology, geophysics, geology, glaciology, geodesy and cartography, atmospheric physics and chemistry, oceanography, archeology, and logistics.

#### A-57853

Martín-Bueno, M., **Antarctic archeology and the San Telmo project** [Arqueología antártica: el proyecto San Telmo y el descubrimiento de la *Terra australis* antártica], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cachó and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.421-428, In Spanish with English summary. 26 refs.

An archeological study called the *San Telmo* Project, carried out on Cape Shirreff by the 1993-1994 Spanish Antarctic Expedition, is described. Underwater and land exploration includes the search of the remains of the Spanish vessel *San Telmo*, lost in the area in 1819, and the study of human impact on the antarctic continent since the time of its discovery. Preliminary findings include evidence of human presence in the area during the period of 1819 to 1824.

#### A-58035

Swithinbank, C., **Alien in Antarctica: reflections upon forty years of exploration and research on the frozen continent**, Blacksburg, VA, The McDonald & Woodward Publishing Company, 1997, 214p., Includes a short list of acronyms and a brief glossary. Refs. p.199-206.

**DLC G875.S95A3 1997**

The work is autobiographical, recounting the author's beginning interest in and eventual dedication to studying geological and geophysical aspects of the polar regions, especially of the various ice forms. The major emphasis of his work centered on the Victoria Land/Ross Sea/Ross Ice Shelf areas of Antarctica. Along the way, many of his colleagues were those whose names have long associations with Antarctica and for whom many antarctic physical features are named. Interspersed are numerous fine photographs and black and white sketch maps in and of the regions of specialization.

#### A-58036

Stonehouse, B., **Arctic and antarctic tourism: can the one learn from the other**, *University of Lapland. Arctic Centre Reports*, 1996, No.22, Proceedings of the Arctic Opportunities Conference, Sep. 12-15, 1994, Rovaniemi, Finland. Edited by M. Lange, p.347-356, 11 refs.

Tourism is a growing industry providing opportunities for development at both ends of the world. This paper draws attention to one aspect—shipborne tourism—that is currently increasing in importance and impact in both polar regions. In Antarctica, the most effective regulation of ship-

borne tourism so far has arisen from guidelines provided by the tour operators themselves, a system that now requires reinforcement by inspection rather than new and complex regulations from Antarctic Treaty authorities. The Arctic has no such code, and there is little evidence that legislation provides an effective alternative. (Auth. mod.)

#### A-58037

Gurney, A., **Below the convergence: Voyages toward Antarctica, 1699-1839**, New York, NY, W.W. Norton & Company, 1997, 315p., Bibliography p.299-303.

**DLC G870.G78 1997**

The scope of this book is to sketch some of the voyages by explorers, sealers, and whalers into the southern ocean which, over a span of a hundred years, eliminated *Terra australis incognita* from the world's map and whittled it down to a much smaller continent—Antarctica. During the course of the whittling process descriptions are given of the Greek knowledge of the globe-balancing southern land; the development of precise marine navigation, and the conquest of the seaman's bane: scurvy. Details are told of the contributions to discovery of Edmond Halley, James Cook, Weddell, Brisbane, Biscoe, Kemp, Balleny, Bellingshausen, and d'Urville.

#### A-58038

Rubin, J., **Antarctica**, Hawthorn, Victoria, Australia, Lonely Planet Publications, 1996, 362p., 1st edition.

**DLC G860.R83 1996**

This "directory" is essentially a guidebook for would-be antarctic tourists, designed as an aid in planning a trip to Antarctica. It covers such topics, among others, as passports, visas, customs; shipboard accommodations, gateways to the continent, dangers and annoyances, and legal matters. Segments on antarctic fauna, geography, seasons and climate, protected areas, as well as detailed maps of six gateway cities and their histories, and maps of numerous other antarctic areas, are included. Among other features of the book are an index, glossary, a short list of acronyms, and précis of the physical aspects of the Falklands, Shetlands, and South Sandwich Is., Antarctic Peninsula, Ross Sea/Ice Shelf, selected sites in East Antarctica, and Amundsen-Scott Station.

#### A-58045

Stehberg, R., Lucero, V., **Archaeological excavations on Cape Shirreff** [Excavaciones arqueológicas en playa Yámana, cabo Shirreff, isla Livingston, Shetland del Sur, Antártica], *Santiago de Chile. Instituto Antártico Chileno. Serie científica*, 1996, No.46, p.59-81, In Spanish with English summary. Refs. p.80-81.

From the excavations of two rocky shelters located on Cape Shirreff, and the analysis of the materials obtained, the historical frame is given in which three partly buried human skeleton-fragments, found near the shelters' entrances are included. All the remains found are related to the 1819-1824 sealing occupation. The bone-fragments belong to a young female whose skull indicates a mongolian-caucasian origin. It is hypothesized that the sealers employed individuals from the southern tip of America as crew for their activities. (Auth. mod.)

#### A-58081

Ussai, M., **About the great austral freezer. Antarctica of Italian geographers from 1800 to 1918** [Intorno alla gran ghiacciaia australe. L'Antartide dei geografi italiani dal'800 al 1918], *Ambiente Antartide*, June 1997, Special issue, Consiglio Nazionale delle Ricerche. Direzione Centrale Attività Scientifiche, 188p., In Italian with English extended summary by M. Manzoni and S.P.S. Phillips. Refs. p.131-136.

The author's work traces back the sources of Italian literature about Antarctica through the nineteenth century and up to 1918. The bibliography lists 126 titles by 57 authors, consisting of journal articles, books, letters, geographic maps, and photographs. The features and contents of each document analyzed have been arranged in a database, with short reference texts for each one. These texts are the basic analytical product of the study and contain: a summary of the contents of the documents; quotations from the text that may be important (scientifically, linguistically etc.); identification of the context, typology and interest of the text; elements subject to



interpretation (historical analysis, scientific theories etc.); depth and originality of the themes; and comments on the document's scientific and literary merit.

#### A-58125

Scientific Committee on Antarctic Research, **SCAR bulletin No.127, October 1997**, *Polar record*, Oct. 1997, 33(187), p.361-374.

This issue of the Bulletin contains the following: a list of stations of SCAR Nations operating in the Antarctic, winter 1997, with maps of their corresponding locations; a report on resolutions and measures adopted at the XXth Antarctic Treaty Consultative Meeting, held in Utrecht, The Netherlands, Apr. 29-May 10, 1996; and outlines of management plans for Site of Special Scientific Interest (SSSI) No.9 (Rothera Point, Adelaide I.), and No.19 (Linnaeus Terrace, Asgaard Range, Victoria Land).

#### A-58140

Shiraishi, K., **German antarctic activities**, *Antarctic record*, July 1997, 41(2), p.589-611, In Japanese with English summary. 7 refs.

Antarctic expeditions are different from country to country in terms of scale of the expedition, organization, funding, geographic location of the area of activity, etc. It is suggested that, although methods used by one country are not always adaptable to other countries, information on foreign countries' antarctic programs would contribute to upgrading the Japanese Antarctic Expedition (JARE). The author participated in the German Antarctic Expedition during the 1996-96 field season, focussing on the transportation system, air operation and inland traverses. This report summarizes the activity of the German expedition and highlights some aspects which, in the author's opinion, should be incorporated into JARE. (Auth. mod.)

#### A-58152

Lutjeharms, J.R.E., **Bibliography of the South African Journal of Antarctic Research**, *South African journal of antarctic research*, 1995, 25(1-2), p.51-84.

The purpose of this bibliography is to make the full set of research articles and notes published in the South African Journal of Antarctic Research over the past 26 years available to the scientific community in an easily accessible way. Only scientific and historical articles with identified authors have been included. The bibliography is arranged in an alphabetical order, by the names of authors, and also in a chronological sequence, in order to give easy access to the information.

#### A-58155

Nicol, S., Endo, Y., **Krill fisheries of the world**, *Food and Agriculture Organization of the United Nations. FAO fisheries technical paper*, 1997, No.367, 100p., Refs. p.44-63.

There are currently at least 6 commercial fisheries harvesting 6 different species of euphausiids, or krill. Most of these fisheries have been operating for over 20 years but there is very little generally available information on these fisheries other than that for antarctic krill. In this report, the authors summarize information from a number of sources on the fisheries for, and relevant biology of krill, including *Euphausia superba*, *E. pacifica*, *E. nana*, *Thysanoessa inermis*, *Thysanoessa rashcii* and *Meganyctiphanes norvegica*. Krill fisheries currently produce products mainly for the aquaculture and sport fishing market but considerable effort has also been put into developing products for human consumption, particularly from antarctic krill. The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) has developed procedures for managing the harvest of antarctic krill which may be applicable to other fisheries. (Auth. mod.)

#### A-58163

De Rossi, G., Puccini, M., Puccetti, G., **Airborne polar experiment (APE). Tests and qualification of the scientific instrumentation installed on the stratospheric platform M-55 aircraft**, *SPIE—The International Society for Optical Engineering. Proceedings*, 1995, Vol.2583, Advanced and next-generation satellites. Edited by H. Fujisada and M.N. Sweeting, p.301-311, 4 refs.

#### DLC TL796.A33 1995

The paper describes the environmental tests to be carried out on the scientific instrumentation to be flown on the M-55 Geophysika in the frame of the APE Program. The instruments, developed by different European research institutes, are for remote sensing and *in situ* measurements of the major components of the Earth's stratosphere. The paper presents the technological activities that ENEA (Ente Nazionale per le Nuove Tecnologie l'Energia e l'Ambiente) is carrying out in its laboratories to verify the correspondence of the various instruments to meet the requirements for airborne application. The reference documents used have been the RTCA/DO-160C and the MDB (Myasishchev Design Bureau) specifications. The program considers at present the fulfillment of two experimental campaigns, a first one in the Arctic and a second one in Antarctica. (Auth. mod.)

#### A-58164

Valenzuela, A., Mujica, F., **Design concepts for OLME experiment on board FASat-Alfa microsatellite**, *SPIE—The International Society for Optical Engineering. Proceedings*, 1995, Vol.2583, Advanced and next-generation satellites. Edited by H. Fujisada and M.N. Sweeting, p.576-584, 10 refs.

#### DLC TL796.A33 1995

The Ozone Layer Monitoring Experiment (OLME) is one of the primary payloads for the Chilean FASat-Alfa microsatellite. The objective of this experiment is to measure Solar Backscattered Ultra Violet (SBUV) radiation at several wavelengths, with the purpose to retrieve total ozone content, specially over Chile and Antarctica. The OLME instrument must be light, small and relatively cheap, to meet the mission constraints, so a simple unorthodox design is pursued, using CCDs and interference filters, together with non-imaging detectors. The design concepts behind this new approach to ozone remote sensing are presented, together with the processing procedures developed to retrieve ozone content from radiance measurements. (Auth.)

#### A-58191

Brazil. Comissão Interministerial para os Recursos do Mar, **Informativo CIRM, Vol.9, No.1**, Jan-Jun 97, p.1-12, In Portuguese.

This issue contains the following news items pertinent to Antarctica: krill biomass estimates in Area 48 (South Atlantic Ocean); the inauguration of an antarctic museum in Brazil; the award ceremony at a photographic competition on antarctic themes; and the 21st Antarctic Treaty Consultative Meeting.

#### A-58227

Naveen, R., **Oceanites Site Guide to the Antarctic Peninsula**, Chevy Chase, MD, Oceanites, Inc., 1997, 129p.

This Site Guide is intended to ensure that tour operators and their expedition staff and passengers have access to the most current information over Antarctic Peninsula visitor sites. The Site Guide contains 4 regional maps, 16 site-specific orientation maps, and 117 photographs. Overviews of the four regions of the Antarctic Peninsula covered by the Site Guide delineate major scenic, historical and wildlife aspects of each region. The Site Guide is more than just a descriptive narrative: it is itself a management tool for conservation. It identifies environmental sensitivities at these sites, and recommends ways that disturbance to wildlife and other impacts can be minimized.

#### A-58271

El-Sayed, S.Z., **Historical perspective of research in the Antarctic Peninsula region**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.1-13, Refs. p.12-13.

#### DLC QH541.264.A6F67 1996

This chapter attempts to put into historical perspective the evolution and present status of marine biological/oceanographic research in an increasingly important region of the southern ocean. In tracing the history of this development, one notes that the biological exploration of the antarctic seas has undergone several successive phases beginning with the small, yet important, role played by the early naturalists/natural historians in the expeditions of James Cook, Charles Wilkes and James Clark Ross,



through the 'Heroic Age' at the turn of the century, the IGY, the *Eltanin* and the BIOMASS years. The post-BIOMASS phase is noted for the initiation of several scientific multidisciplinary programs to study phenomena and processes of global significance in which Antarctica and its surrounding seas play a key role. (Auth.)

#### A-58290

Naveen, R., **Human activity and disturbance: building an Antarctic Site Inventory**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.389-400, 10 refs.

**DLC QH541.264.A6F67 1996**

The Antarctic Peninsula and west of the Peninsula is a region where many research stations are situated, and also where the bulk of antarctic shipboard tourism takes place. A brief summary of this human history in Antarctica reveals a wide range of real and possible disturbances. Potential impacts from human activities continue to exist—and are expected to increase—because of the growing number of expedition tour operators and of the number of trips being offered. In this context, the soon-to-be-effective Antarctic Environmental Protocol is intended to provide a new measure of protection by ensuring that tourism, science, and all other human activities do not have adverse impacts on the antarctic environment. The Protocol requires environmental assessments to be prepared before any such activities take place, and efforts have begun to create a database and inventory of information that assists in both the preparation and the evaluation of these assessments. (Auth. mod.)

#### A-58291

Kennicutt, M.C., II, McDonald, S.J., **Marine disturbance—contaminants**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.401-415, Refs. p.413-415.

**DLC QH541.264.A6F67 1996**

Contaminant inventories, sources, transport and depositional processes, and potential biological impacts along the Antarctic Peninsula are summarized and discussed. The most frequently measured contaminants are hydrocarbons, chlorinated organic compounds and metals. The greatest perturbations of the peninsular environment are related to the presence of humans and are generally local in extent. All stations studied to date exhibit a "halo" of contaminants, primarily hydrocarbons and trace metals. Long distance atmospheric transport of contaminants to Antarctica appears to be a minor input and the resultant concentrations are expected to be far below known thresholds for toxic or lethal biological effects. Measures of biological response, both inducible enzymes and metabolite formation, demonstrate that organisms are being exposed and have responded to this exposure in close proximity to a scientific station in Arthur Harbor, Anvers I. Based on the available data, the peninsula appears to be relatively pristine and exhibits contaminant accumulation and measurable biological responses in close proximity to human settlements. (Auth. mod.)

#### A-58292

Agnew, D.J., Nicol, S., **Marine disturbances—commercial fishing**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.417-435, Refs. p.433-435.

**DLC QH541.264.A6F67 1996**

Catches of seals and whales were made around the Antarctic Peninsula in the 19th and early 20th centuries. More recently, both finfish and krill have been taken in the area. Fishing is managed by the CCAMLR. Total catches of finfish from 1960-70 to 1993-94 were 88,151 tons, and catches of krill over the same period were 823,897 tons. The country currently taking most krill in the subarea is Japan, usually taking over 60% of the catch each year. Between 40 and 80 thousand tons of krill is taken annually in the Antarctic Peninsula region, currently about half the total catch of antarctic krill, but substantially less than estimates of krill biomass in the area. Large populations of birds and seals, especially chinstrap penguins, breed in the area and rely on krill to successfully rear their young. However, despite the potential for competition between the fishery

and predators, the available evidence suggests that the fishery would need to increase substantially before it attained levels where it might impact adversely on these predator populations. (Auth. mod.)

#### A-58318

Krause, R.A., **Steps toward the institutionalization of German polar research in the 19th century** [Schritte zur Institutionalisierung der Polarforschung in Deutschland im 19. Jahrhundert], *Zeitschrift für geologische Wissenschaften*, Dec. 1993, 21(5/6), p.617-626, In German with English summary. Selected from the symposium "Geschichte der Geowissenschaften in den deutschen Ländern", presented at the Berg Akademie in Freiberg, 17-20 September, 1992. 16 refs.

**DLC QE1.Z395**

From 1865 onwards the importance of polar research was propagated in Germany by August Petermann (1822-1877), Moritz Lindeman (1823-1908) and Georg v. Neumayer (1826-1909). Several expeditions were made and East Greenland was found to be an area of great scientific interest. However, there was no continuity in polar science. But the restriction of scientific problems to questions regarding meteorology and geomagnetics was the decisive step for the successful organization of the first international polar year in 1882-83 until around the turn of the century the German government temporarily supported antarctic research. An attempt to define institutionalization is made at the beginning of the paper and some light is thrown upon the history of the German way of institutionalizing polar research. Thus it is possible to analyze problems associated with the institutionalization of polar research and to look at the present trends of science organization. (Auth.)

#### A-58319

Wagner, S., **Polar research in Germany, 1945-1992** [Polarforschung in Deutschland von 1945-1992], *Zeitschrift für geologische Wissenschaften*, Dec. 1993, 21(5/6), p.761-764, In German with English summary. Selected from the symposium "Geschichte der Geowissenschaften in den deutschen Ländern", presented at the Berg Akademie in Freiberg, 17-20 September, 1992. 2 refs.

**DLC QE1.Z395**

The International Geophysical Year (1957-58) gave new impulses to polar research in Germany. With the overwintering from 1959 to 1961 of three German scientists at Mirny Station, began a persistent, cooperative participation in Soviet antarctic expeditions, which lasted over 30 years. In 1979 the German government passed a resolution on an extensive antarctic research program. The political union of Germany in 1990 led to a common German research conception. (Auth. mod.)

#### A-58335

**Polar news/Notizie polari, Vol.12, No.7-8, 1997, p.43-49**, In Italian and English.

The news items pertinent to Antarctica in this issue deal with the following: NSF grants for new studies of the meteorite ALH84001; the anti-freeze gene in polar fish; human activities and poultry disease in penguins; and the successful circumnavigation of James Ross I. by a Greenpeace vessel.

#### A-58336

**Polar news/Notizie polari, Vol.12, No.6, 1997, p.36-42**, In Italian and English.

The news items pertinent to Antarctica in this issue deal with the following: the primary goals of EOS program; Mount Erebus seismic stations and equipment; Japan's scientific whaling expeditions and the IWC; ocean-atmosphere variability; ground-based infrared atmospheric measurements; commercial fishing around Heard I.; and the population decline in the Adélie penguins due to climatic changes.

#### A-58337

**Polar news/Notizie polari, Vol.12, No.5, 1997, p.29-35**, In Italian and English.



The news items pertinent to Antarctica in this issue deal with the following: the ANARE jubilee science symposium; ice-sheet thickness measurements by GPS; freshwater crayfish fossil discovery by NSF; stricter fishing regulations in antarctic waters; the chronology of antarctic glaciations; and fishing regulations in the Ross Sea.

**A-58338**

**Polar news/Notizie polari, Vol.12, No.4, 1997, p.22-28, In Italian and English.**

The news items pertinent to Antarctica in this issue deal with the following: Gondwana and paleoclimatological and paleontological evidence of the continental drift; the ANSMET program and the search of meteorites; flights between Australia and Antarctica; data on geomagnetic pulsations and the location of sensors; and ERS-2 preliminary results of the global ozone monitoring program.

**A-58339**

**Polar news/Notizie polari, Vol.12, No.3, 1997, p.15-21, In Italian and English.**

This issue contains two news items pertinent to Antarctica: evidence of the connection between the ozone hole and fish pathology; and installation and servicing of automatic weather stations in remote antarctic locations, including Cape Crozier, Mount Erebus and the Amundsen-Scott Station.

**A-58340**

**Polar news/Notizie polari, Vol.12, No.2, 1997, p.8-14, In Italian and English.**

The news items pertinent to Antarctica in this issue deal with the following: the objectives of the Antarctic Science beyond 2000 Workshop; phytogeography of continental antarctic lichens; re-calculating the position of the South Pole; the physiology of antarctic echinoderms; South Africa-New Zealand joint antarctic expedition, 1998-1999; the icebreaker *Healy*; and the 50th anniversary of the French polar expeditions.



## B. BIOLOGICAL SCIENCES

### B-56350

Czeczuga, B., Inoue, M., Upreti, D.K., **Carotenoids in lichens from the Antarctic**, *Antarctic record*, July 1996, 40(2), p.247-254, With Japanese summary. Refs. p.252-254.

Column-, and thin-layer chromatography revealed the presence of the following carotenoids in the thalli of 33 lichen species from the Antarctic:  $\alpha$ -carotene,  $\beta$ -carotene,  $\delta$ -carotene,  $\epsilon$ -carotene,  $\beta$ -cryptoxanthin, lutein, zeaxanthin, echinenone, hydroxyechinenone, canthaxanthin,  $\alpha$ -doradexanthin,  $\beta$ -doradexanthin, astaxanthin, lycopene-5,6-epoxide, lutein epoxide, antheraxanthin, neoxanthin, violaxanthin, auroxanthin, mutatoxanthin, and capsochrome. The total content of carotenoids ranged from 23.25 (*Leptogium puberulum*) to 123.50  $\mu\text{g/g}$  dry wt (*Polycauliona regalis*). (Auth.)

### B-56355

Dartnall, H.J.G., **Rotifers of Heard Island: preliminary survey, with notes on other freshwater groups**, *Royal Society of Tasmania. Papers and proceedings*, June 30, 1995, Vol.129, p.7-15, Refs. p.15.

DLC Q93.T2 1995

Twenty rotifers (three Bdelloidea and 17 Monogononta, including new species of *Encentrum* and *Notholca*), a platyhelminth, gastrotrich, two nematodes, two tardigrades, one enchytraeid worm, four cladocerans, two copepods and three species of mites were recovered from five small pools on Heard I. The results indicate that the Heard I. fauna is closer to that of Signy I. and Macquarie I. than to that of the much nearer Kerguelen archipelago. (Auth.)

### B-56356

Dartnall, H.J.G., **Rotifers, and other aquatic invertebrates, from the Larsemann Hills, Antarctica**, *Royal Society of Tasmania. Papers and proceedings*, June 30, 1995, Vol.129, p.17-23, Refs. p.23.

DLC Q93.T2 1995

Seventeen species of rotifers (11 Monogononta and six Bdelloidea), three tardigrades, two arthropods, as well as protozoans, a platyhelminth and nematodes were found in 13 freshwater lakes in the Larsemann Hills. Various species are described and some are illustrated. (Auth. mod.)

### B-56364

Evseenko, S.A., **Taxonomic status of the "armless" flounder, *Achiropsetta slavae* (Achiropsettidae)**, *Journal of ichthyology*, 1990 (Pub. July 1991), 31(1), p.44-56, Translated from Voprosy ikhtiologii 30(5). 17 refs.

DLC SH1.V713 1991

The morphological characteristics of juvenile "armless" flounder (*Achiropsetta slavae*) from Antarctica are presented. Its taxonomic status is discussed and the position of this species in the genus *Mancopsetta* is determined. Differences between *M. slavae* and the type species of the genus, *M. maculata* (Günther), consist of the degree of ossification of the skeleton, coloration, and other characters. It is suggested that *M. slavae* is a cryopelagic form. (Auth.)

### B-56365

Favero, M., **Breeding biology of the antarctic tern *Sterna vittata* on Potter Peninsula** [Biología reproductiva del Gaviotín Antártico, *Sterna vittata*, en Península Potter, Isla 25 de Mayo (King George), Islas Shetland del Sur, Antártida], *Rivista italiana di ornitologia*, Sep. 1994, 64(1), p.62-70, In Spanish with Italian and English summaries. 24 refs.

DLC QL690.I8R58

The population dynamics and reproductive biology of the antarctic tern, *Sterna vittata*, were studied from Jan. 1987 to Jan. 1988 at Potter Peninsula. Three hundred fifty-eight breeding pairs, distributed in 8 colonies, were identified. Dates of arrival, nest construction, egg laying, hatching and fledging were determined. Clutch size, egg size, growth and breeding success were also studied and the results are compared with previous data. (Auth.)

### B-56366

Godlewska, M., Rakusa-Suszczewski, S., **Variability of krill, *Euphausia superba*, Dana 1852 (Crustacea, Euphausiacea), distribution and biomass in the Western Antarctic (Bransfield Strait, Drake Passage, Elephant Island) during 1976-1987**, *Investigación pesquera*, Dec. 1988, 52(4), p.575-586, With Spanish summary. Refs. p.585-586.

DLC SH285.I6 1988

Data on the distribution and biomass of krill in the years 1976-1987 have been compiled. Significant fluctuations of the mean surface density are found, from 0.26 t/Nm<sup>2</sup> to 153 t/Nm<sup>2</sup>. Krill biomass increases from Oct. to Feb., and decreases in Mar. It is calculated that the increment due to the growth of animals is about 6 times, and, due to inflow with currents, about 10 times during summer, from Dec. to Feb. It is suggested that hydrodynamic and synoptic factors, as well as bottom topography, are mainly responsible for the distribution and biomass fluctuations of krill. (Auth. mod.)

### B-56368

Pagès, F., Gili, J.M., **Siphonophores (Cnidaria, Hydrozoa) collected during the "Maggá Dan" Expedition (1966-67) from Africa to Antarctica**, *Scientia marina*, Mar. 1989, 53(1), p.53-57, With Spanish summary. 32 refs.

DLC SH285.I6

Nine species of siphonophores were collected during the Belgian "Maggá Dan" Expedition in a transect from South Africa to antarctic waters between Dec. 1966 and Feb. 1967. Two species were recorded for the first time in the Antarctic: *Bargmannia elongata* and *Nanomia bijuga*. The bracts of *Thalassophyes crystallina* were found and described from material collected during the expedition. Two substantial colonies of *Mica micula* allowed a redescription of species; its systematic position is discussed. (Auth.)

### B-56371

Boucher, N.P., Prézelin, B.B., **Spectral modeling of UV inhibition of *in situ* antarctic primary production using a field-derived biological weighting function**, *Photochemistry and photobiology*, Sep. 1996, 64(3), p.407-418, 57 refs.

An approach for hindcasting or forecasting UV radiation (UVR, 280-400 nm) effects on *in situ* rates of aquatic primary production when field measurements do not include estimates of UVR effects is described. A composite of spectral field measurements is employed to model UVR-dependent rates of photosynthesis in diatom-dominated waters in a coastal region of the southern ocean. Assumptions, caveats and limitations of the modeling are discussed. Calculations begin with the 1991 Palmer Long Term Ecological Research (LTER) primary production and optical databases, from which daily integrated rates of carbon fixation in the absence of UVR are calculated as a function of depth for a 140 km transect line sampled between dawn and dusk of a single day (Nov. 14, 1991). The UVR measurements from the nearby NSF/OPP Polar Network at Palmer Station are used to determine ozone concentration on the day of the transect. (Auth. mod.)

### B-56373

Marshall, D.J., Pugh, P.J.A., **Origin of the inland Acari of continental Antarctica, with particular reference to Dronning**



**Maud Land**, *Linnean Society of London. Zoological journal*, Oct. 1996, 118(2), p.101-118, Refs. p.115-118.

The extant Acari occurring on the inland mountain ranges and nunataks of continental Antarctica comprise only pre-Pleistocene endemic Prostigmata and Cryptostigmata of which the Prostigmata are the probable earlier colonists. The inland acarofauna of continental Antarctica has a different origin from that of maritime Antarctica, though both are the relict descendants of a Mesozoic acarofauna, which has been radically depleted by one or more Mesozoic and/or Cenozoic glacial events. (Auth.)

#### B-56375

Alekseeva, E.I., Alekseev, F.E., Konstantinov, V.V., Boronin, V.A., **Reproductive biology of Grenadiers, *Macrourus carinatus*, *M. whitsoni*, *Coelorinchus fasciatus* (Macrouridae), and *Patagonotothen guentheri shagensis* (Nototheniidae) and the distribution of *M. carinatus***, *Journal of ichthyology*, 1993, 33(1), p.71-84, Translation of Voprosy ikhtiologii, 32(4), 1992, 105-115. 23 refs.

#### DLC SH1.V713

Gametogenesis, maturation of ovaries, type of spawning, and fecundity of three representatives of the family Macrouridae and of *Patagonotothen guentheri shagensis* (Nototheniidae) are described. An ovarian maturity stage scale is provided for the genus *Macrourus*. Elements of the reproductive cycles are examined for *M. carinatus* and *P. guentheri shagensis*. Population unity of the *M. carinatus* group is postulated for the Falkland-Patagonia region. (Auth.)

#### B-56376

Lay, L., Panza, L., Riva, S., Khitri, M., Tirendi, S., **Regioselective acylation of disaccharides by enzymatic transesterification**, *Carbohydrate research*, Sep. 23, 1996, Vol.291, p.197-204, 15 refs.

In this note, two schemes for more systematic studies of lipases and proteases in the acylation process are presented. *Candida antarctica* was found useful in both schemes. Experimental details of the schemes are provided.

#### B-56377

van der Loo, W., Boussès, P., Arthur, C.P., Chapuis, J.L., **Compensatory aspects of allele diversity at immunoglobulin loci: gene correlations in rabbit populations devoid of light chain diversity (*Oryctolagus cuniculus* L.; Kerguelen Islands)**, *Genetics*, Nov. 1996, 144(3), p.1181-1194, 56 refs.

Allele distributions at heavy chain loci in populations fixed for the light chain *b* locus were analyzed. An analysis was also made of the *a* locus that encodes the predominantly expressed heavy chain variable region, and the *d* and *e* loci that control different parts of the Ig gamma class constant region. While there was excess heterozygosity, genetic differentiation between localities was extensive and was most pronounced for females. This was in marked contrast with observations in areas where *b*-locus diversity was important and confirms a negative correlation between *e*- and *b*-locus heterozygosity. Trigenic disequilibria corresponded to a significant negative correlation between *e*- and *a*-locus heterozygosity due mainly to strong variation among localities within the context of pronounced (digenic) linkage disequilibria. Although substantial, the average increase in *a/e*-locus single heterozygosity implemented by higher order disequilibria within localities was not significant. (Auth. mod.)

#### B-56385

Crame, J.A., **Occurrence of the bivalve genus *Mantidula* in the Early Cretaceous of Antarctica**, *Paleontology*, July 1995, 38(2), p.299-312, 38 refs.

A new occurrence of a pergamidiid bivalve genus, which can probably be assigned to *Mantidula* Waterhouse, 1960, is established within the Early Cretaceous (Berriasian) of Antarctica. Such a record is of particular interest as this taxon was only known previously from the Late Triassic of New Zealand and New Caledonia. The antarctic material is contained within a new species, *M. complanata*, which is somewhat smaller and less inflated than the genotypic *M. problematica* (Zittel). There are indications from the antarctic species that, at least in juvenile specimens, the hinge region of the left valve is characterized by a prominent saddle-shaped fold

(or tooth) and a triangular resilifer. Using features such as these and details of the shell structure, it is possible to establish close links between *Mantidula*, the pergamidiid genus *Krumbeckiella*, and the eurydesmid genus *Eurydesma*. The eurydesmid-pergamidiid group is essentially a Southern Hemisphere one with high-latitude origins in the Early Permian. Following a phase of expansion through the Triassic, it would appear to have retracted to the single antarctic occurrence of *Mantidula* in the Early Cretaceous. (Auth. mod.)

#### B-56417

Gutt, J., Ekau, W., **Habitat partitioning of dominant high antarctic demersal fish in the Weddell Sea and Lazarev Sea**, *Journal of experimental marine biology and ecology*, Dec. 1, 1996, 206(1-2), p.25-37, 31 refs.

Using underwater photography twelve, structural habitat characteristics of the six most abundant demersal high antarctic fish species were investigated. Two categories of relationships between fishes and benthos were found: (1) *Trematomus lepidorhinus* (Pappenheim) and *T. loennbergi* (Regan) preferred rich epibenthic communities dominated by sessile suspension feeders. The fish used this three-dimensional structure both to settle on and hide in. (2) *Prionodraco evansii* (Regan), *Dolloidraco longedorsalis* (Rhoule) and *Trematomus scotti* (Boulenger) occurred mostly in areas free of stones and biogenous debris and with generally less epifauna. For *Chionodraco myersi*, no significant link with the benthic habitat was found; it seemed to have an intermediate position between the groups mentioned above. (Auth. mod.)

#### B-56457

Vaulot, D., et al, **Morphology, ploidy, pigment composition, and genome size of cultured strains of *Phaeocystis* (Prymnesiophyceae)**, *Journal of phycology*, Dec. 1994, 30(6), p.1022-1035, 39 refs.

#### DLC QK564.P47

The authors examined cell morphology, ploidy level, cell size, pigment composition, and genome size in 16 cultured strains of *Phaeocystis* Lagerheim. Two strains originated from the Antarctic, 3 from the tropical western Atlantic, and 11 from temperate regions (Eastern Atlantic, English Channel, North Sea, and Mediterranean Sea). Thirteen strains made colonies morphologically similar to *P. globosa* Scherffel, whereas three never formed colonies under any circumstances. Five-rayed star-like structures with filaments were observed in 11 strains. Two main conclusions emerge from this study. First, the taxonomy of the genus *Phaeocystis* needs to be clarified through a combination of morphological, biochemical, and molecular studies. Second, sexuality is a prevalent phenomenon in *Phaeocystis*, but controls of the sexual cycle are most likely strain-dependent. (Auth. mod.)

#### B-56459

Handa, N., Hayakawa, K., **Vertical transport of organic matter in the various oceanic areas**, Japan National Committee for the International Geosphere-Biosphere Programme. International Symposium on Global Change (IGBP), Tokyo, Mar. 27-29, 1992. Proceedings, Tokyo, Waseda University, [1994], p.298-304, DE94-765351, 10 refs.

Vertical flux of organic matter was determined in Breid Bay, Antarctica, and Hidaka Trough off Hokkaido, Japan. Fatty acid,  $^{13}\text{C}/^{12}\text{C}$ , and  $^{14}\text{C}/^{13}\text{C}$  of the organic matter of the sinking particles were determined and it was found that the ratio of unsaturated to saturated fatty acid, and  $\delta^{13}\text{C}$  were valuable tools to diagnose phytoplankton growth in the surface and subsurface waters. In addition to this,  $\Delta^{14}\text{C}$  gave an indication of lateral transport of organic matter in the continental shelf and its slope areas. (Auth. mod.)

#### B-56469

Boström, S., **One new and two known nematode species from the subantarctic islands South Georgia and east Falkland Islands**, *Fundamental and applied nematology*, 1996, 19(2), p.151-158, With French summary. 29 refs.

Populations of 3 species of nematodes, *Pelodera arnbomi* n.sp., *Plectus rhizophilus* and *Acrobeloides nanus*, are described from South Georgia for the first time. *P. arnbomi* n.sp. differs from all species of *Pelodera* with



a dome-shaped female tail by its conical female tail shape. It differs from *P. teres*, *P. conica* and *P. incilaria* by the number of preanal papillae in the male bursa (2 vs >2). It is distinguished from *P. punctata* by a smaller body size (880 µm vs 1200-2500 µm) and smaller c'-value (2.8 vs 4), and from *P. comandorica* by a smaller body size (880 vs 1080-1500 µm) and larger c'-value (2.8 vs 1.5) in the females. The relation between some species of *Plectus*, especially the identity of *P. rhizophilus* and *P. varians*, is discussed. A population of *A. nanus* from east Falkland Is. is compared with the South Georgia population and found to differ significantly in many quantitative characters. However, the ranges of measurements and ratios and also the qualitative characters are overlapping between the two populations. (Auth.)

#### B-56470

Hariyama, T., Terakita, A., Meyer-Rochow, V.B., **Rhythmicity of chromophore turnover of visual pigment in the antarctic amphipod *Orchomene plebs* (Crustacea; Amphipoda)**, *Journal of comparative physiology A*, Nov. 1993, 173(5), p.615-619, Refs. p.618-619.

Relative retinal amounts in the compound eye of the antarctic amphipod *Orchomene plebs* were assessed during conditions of continuous summer daylight every 3 h over a period of 48 h. The habitat of the experimental animal is the bottom of the Ross Sea down to depths of at least 400 m; water temperature is a constant -1.8°C. A periodicity of 12 h was detected with relative amounts of 11-*cis* retinal exhibiting peaks at midday and at midnight and troughs at 7.00 h and 19.00 h. The result that 90% of retinoid were insoluble in n-hexane suggests that at least 90% of the measured retinoid were attached to membrane-bound proteins such as opsin. Selective light adaptation showed that the visual pigments were thermostable and photoregenerable. The main absorbance peak of rhodopsin, compared with meta-rhodopsin, seems to be in the longer wavelengths. (Auth.)

#### B-56481

Ingole, B.S., Parulekar, A.H., **Microfauna of Schirmacher Oasis, Antarctica: I. Water-moss communities**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.139-148, 24 refs.

DLC G850.I53I53 1984

Ten limnetic lakes in the Schirmacher Ponds region were surveyed during Jan.-Feb. 1985. Distribution and abundance of microfauna with the associated algal and moss communities were studied. Population density and biomass were greater in the sediment covered with moss turf. The fauna was mainly comprised of 7 taxonomic groups, dominated by nematodes (22.13%), followed by protozoans (19.77%), turbellarians (15.47%) and tardigrades (09.23%). Other faunal components were oligochaetes (01.38%), rotifers (00.94%) and acarides (00.71%). Numerous invertebrate cysts were also recorded (27.27%) in all the samples. The maximum faunal density of 304 numbers/10 cm<sup>2</sup> and minimum of 45 numbers/10 cm<sup>2</sup> were recorded in the moss turf and moss carpet, respectively. Algal communities associated with microfauna belonged to the genus *Oscillatoria*, *Synechocystis*, *Desmidium* and *Choococcus* of the blue-green algae. Estimated faunal standing crop seem to be related to the sediment characteristics. (Auth.)

#### B-56482

Ingole, B.S., Verlencar, X.N., Parulekar, A.H., **Microfauna of Priyadarshini Lake, Schirmacher Oasis, Antarctica**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.149-154, Refs. p.153-154.

DLC G850.I53I53 1984

The benthos of Priyadarshini Lake, Schirmacher Ponds, was investigated during the austral summer 1984-85. Resting eggs of micro-invertebrates dominated the total fauna, especially in the lake bottom. Nematodes, turbellarians and tardigrades were abundant in the supra-littoral sediment covered with vegetation. Salinity and dissolved nutrients in the surface water column showed very low concentrations and the values fluctuated with the weather conditions. (Auth.)

#### B-56483

Shivaji, S., **Preliminary note on bacteria and yeasts of Antarctica**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.155-157, 3 refs.

DLC G850.I53I53 1984

Pure cultures of bacteria and yeast have been set up using water, soil and lake sediment samples collected in the Schirmacher Ponds. Conditions for the growth of these microorganisms have been optimized. Majority of the microorganisms were observed to be psychrophiles and could tolerate 1M salt in the medium. Preliminary studies on the pigments isolated from the chromogenic bacteria are presented. Plasmids have been detected in two out of the twenty bacteria checked. The G+C content of the DNA of some of the bacteria has been determined. (Auth.)

#### B-56493

Wiencke, C., Clayton, M., Langreder, C., **Life history and seasonal morphogenesis of the endemic antarctic brown alga *Desmarestia anceps* Montagne**, *Botanica marina*, Sep. 1996, 39(5), p.435-444, 31 refs.

The life-history of the endemic antarctic brown alga *Desmarestia anceps* Montagne and its seasonal morphological development have been studied in culture under seasonally fluctuating daylengths mimicking the conditions on King George I. Unilocular sporangia are borne terminally on up to 3-celled stalks interspersed with paraphyses. Meiospores develop into dioecious microscopic gametophytes. When cultivated under fixed daylengths male and female gametophytes become fertile at daylengths between 5 and 7 h and between 3 and 9 h, respectively. The induction of fertility is a photoperiodic short-day response as revealed by the effect of a night-break regime. Under fluctuating antarctic daylengths gametophytes become fertile from July to Sep. and juvenile sporophytes are formed in winter. Transformation of uniseriate laterals into corticated branches is comparable to blade formation in the related species *Himantothallus grandifolius*. The results of this study are discussed with relation to evolutionary trends in the Desmarestiales and to the seasonal development of macroalgae especially of polar regions. (Auth. mod.)

#### B-56494

Klingenberg, C.P., Ekau, W., **Combined morphometric and phylogenetic analysis of an ecomorphological trend: pelagization in antarctic fishes (Perciformes: Nototheniidae)**, *Linnean Society of London. Biological journal*, Oct. 1996, 59(2), p.143-177, Refs. p.173-176.

The antarctic fish family Nototheniidae (Perciformes) presumably originated from a benthic ancestor, and several lineages have evolved to live or at least feed in the water column, a trend called pelagization. Here, the authors use information on phylogeny, allometric growth, and diet composition for an integrated analysis of morphological and ecological diversification in this group, mainly focusing on the subfamilies Trematominae and Pleuragramminae. They studied patterns of interspecific variation with principal components and the covariation between morphometric variables and food composition with a partial least-squares analysis. Both analyses revealed a gradient from benthic to pelagic foragers. Measurements of structures involved in swimming have a prominent role in these analyses, suggesting adaptive evolution of these traits. A test of phylogenetically independent contrasts showed that bursts of increased morphological change accompanied habitat shifts. (Auth. mod.)

#### B-56495

Leakey, R.J.G., Archer, S.D., Grey, J., **Microbial dynamics in coastal waters of East Antarctica: bacterial production and nanoflagellate bacterivory**, *Marine ecology progress series*, Oct. 24, 1996, 142(1-3), p.3-17, Refs. p.15-17.

Bacterial production and heterotrophic nanoflagellate (HNAN) bacterivory were determined concurrently with measurements of abundance and biomass at weekly intervals between Dec. 30, 1993 and Feb. 11, 1994 at a shallow, coastal location in Prydz Bay. Bacterial abundance, biomass and production ranged from 2 to 8 x 10<sup>8</sup>/l, 13 to 64 µg C/l and 8 to 14 µg C/l/d, respectively, with maximum values recorded in mid-Jan. The HNAN community comprised choanoflagellate, non-collared and colonial taxa, with non-collared forms dominating abundance and biomass in late Jan. and early Feb. Total HNAN abundance and biomass ranged from 1.6 to 4.2



$\times 10^6/l$  and 8 to 16  $\mu g$  C/l, respectively. HNAN cellular ingestion and clearance rates differed between taxa. During the study period the HNAN community grazed 0.9 to 4.7  $\mu g$  bacterial C/l/d, equivalent to 3 and 12% of bacterial biomass, and 10 and 36% of daily bacterial production. The HNAN community therefore appears to graze substantial bacterial production in antarctic coastal waters during the austral summer, although alternative sources of bacterial mortality are likely to be of importance. (Auth. mod.)

#### B-56497

Wasik, A., Mikolajczyk, E., Ligowski, R., **Agglutinated loricae of some Baltic and Antarctic Tintinnina species (Ciliophora)**, *Journal of plankton research*, Oct. 1996, 18(10), p.1931-1940, Refs. p.1939-1940.

The abundance of species composition of diatoms adhering to the loricae of four agglutinated Tintinnina species, *Laackmanniella naviculaefera*, *Codonellopsis gaussi*, *Cd. balechi* and *Tintinnopsis lobiancoi*, were determined. Diatoms from the *Fragilariopsis* group, *F. cylindrus* and *F. pseudonana*, dominated on tintinnid loricae from the antarctic waters, while *Thalassiosira* spp. were predominant on loricae from the Baltic Sea. Although tintinnids utilized diatoms in the environment, it is not a rule that they use only these which are dominant. Results suggest that certain diatoms are actively selected and agglutinated by particular tintinnid species. (Auth.)

#### B-56498

Aghajari, N., Feller, G., Gerday, C., Haser, R., **Crystallization and preliminary X-ray diffraction studies of  $\alpha$ -amylase from the antarctic psychrophile *Alteromonas haloplanctis* A23**, *Protein science*, Oct. 1996, 5(10), p.2128-2129, 14 refs.

A cold-active  $\alpha$ -amylase was purified from culture supernatants of the antarctic psychrophile *Alteromonas haloplanctis* A23 grown at 4°C. In order to contribute to the understanding of the molecular basis of cold adaptations, crystallographic studies of this cold-adapted enzyme have been initiated because a three-dimensional structure of a mesophilic counterpart, pig pancreatic  $\alpha$ -amylase, already exists.  $\alpha$ -Amylase from *A. haloplanctis*, which shares 53% sequence identity with pig pancreatic  $\alpha$ -amylase, has been crystallized and data to 1.85 Å have been collected. The space group is found to be C222<sub>1</sub> with  $a=71.40$  Å,  $b=138.88$  Å, and  $c=115.66$  Å. Until now, a three-dimensional structure of a psychrophilic enzyme is lacking. (Auth.)

#### B-56501

Tien, R., **Freezing avoidance and the presence of ice in shallow water antarctic fishes**, University of Illinois, 1995, 147p., University Microfilms order No. DA95-43746, Ph.D. thesis. 67 refs.

Fishes inhabiting ice-laden waters of McMurdo Sound have ice present on all external tissues. This includes the integument, gills, and intestinal tract. With one exception, all internal tissues and fluids including the heart, liver, red muscle, white muscle, blood, bile, urine and ocular fluids are ice-free. Ice is consistently identified in the spleens from three shallow water species. This in vivo presence of ice is presupposed by the in vitro mechanism of antifreeze activity. The presence of internal ice explains why all nototheniids in McMurdo Sound produce high systematic concentrations of antifreezes. Furthermore, its localization to the spleen suggests that one function of this organ is to remove ice crystals from the systematic circulation. Details are provided correlating the presence of ice in these fish with ice formation depths, ice growth, and origin of the very cold water in the Sound. (Auth. mod.)

#### B-56502

Demer, D.A., **Accuracy and precision of echo integration surveys of antarctic krill**, San Diego, University of California, 1995, 165p., University Microfilm order No. DA95-19490, Ph.D. thesis. Refs. p.127-145.

Studied were four primary sources of uncertainty in krill density estimates from acoustic surveys. The variance in system calibration with a standard sphere was evaluated in relation to sphere material and diameter, water temperature, and pulse length. Calibration bias was investigated by comparing the theoretical and actual target strength (TS) values of four different standard spheres with the results of a calibration by self-reciprocity. The accuracy and precision of a system calibration with a standard

sphere were estimated as -1.2 dB and +0.3 dB, respectively. Uncertainty in estimating krill TS was investigated through *in situ* measurements. The TS data provided corroboration to an empirical model developed from a linear regression. However, TS values were observed to vary as much as 8 dB, depending on the time of day. Also, Monte Carlo simulations demonstrated the potential errors in developing empirical models from linear regressions of zooplankton scattering data. (Auth. mod.)

#### B-56509

Ramløv, J., Wharton, D.A., Wilson, P.W., **Recrystallization in a freezing tolerant antarctic nematode, *Panagrolaimus davidi*, and an alpine weta, *Hemideina maori* (Orthoptera; Stenopelmatidae)**, *Cryobiology*, Dec. 1996, 33(6), p.607-613, 16 refs.

The ability of haemolymph from the freezing tolerant weta, *Hemideina maori*, and supernatant from homogenates of the freezing tolerant antarctic nematode *Panagrolaimus davidi* to inhibit the recrystallization of ice was examined using the "splat freezing" technique and annealing on a cryomicroscope stage. There was no recrystallization inhibition in weta haemolymph or in insect ringer controls. Recrystallization inhibition was present in the nematode supernatant but this was destroyed by heating and was absent in controls. *P. davidi* survives intracellular freezing and recrystallization inhibition may be important for the survival of this stress. (Auth. mod.)

#### B-56510

Davey, M.C., Rothery, P., **Seasonal variation in respiratory and photosynthetic parameters in three mosses from the maritime Antarctic**, *Annals of botany*, Dec. 1996, 78(6), p.719-728, 42 refs.

Carbon fixation under controlled conditions was measured in three mosses from the maritime Antarctic using an infra-red gas analysis system. Gas exchange parameters were determined during each season in 1993 and 1994 using the Arrhenius equation and a hyperbolic tangent function applied to respiration and photosynthesis, respectively. There was some seasonal variation in the initial slope of the photosynthesis-irradiance curve in all species, although the environmental data suggested that this was of little ecological importance. In all species seasonal changes in the maximum rates of photosynthesis were observed. These changes are considered to be the most important in affecting the overall annual productivity of the mosses. There were no seasonal variations in the optimum temperatures for either gross or net photosynthesis, or for the irradiance at the onset of light saturation. The results have important implications for the use of models to estimate the productivity of the antarctic flora based upon present or predicted climate data. (Auth. mod.)

#### B-56511

Lenihan, H.S., Oliver, J.S., **Anthropogenic and natural disturbances to marine benthic communities in Antarctica**, *Ecological applications*, May 1995, 5(2), p.311-326, 72 refs.

This study describes changes in marine bottom communities along a well-defined gradient of contamination in Antarctica. Community changes were characterized and results used to explore the recovery of disturbed communities. The authors tested the hypotheses that relative rates of recovery of disturbed communities are: (1) dependent on the initial structure of the community and (2) much slower in eutrophic habitats compared with oligotrophic habitats. Based on the results of these tests, predictions of the impacts of future anthropogenic disturbances in different oceanographic conditions of McMurdo Sound were derived. Also tested was the hypothesis that community responses to anthropogenic chemical contamination are similar to those around natural physical disturbances (those caused by icebergs and anchor ice). (Auth. mod.)

#### B-56529

Boveng, P.L., Walker, B.G., Bengtson, J.L., **Variability in antarctic fur seal dive data: implications for TDR studies**, *Marine mammal science*, Oct. 1996, 12(4), p.543-554, 29 refs.

The authors analyzed 19 dive records obtained from female antarctic fur seals (*Arctocephalus gazella*) during three austral summer breeding seasons on Seal I. to assess the extent of individual variation and the potential for using time-depth recorder (TDR) statistics to detect annual changes in six measures of foraging behavior. They report the mean values and typical variability among individuals for dive duration, dive depth, proportion of time submerged, transit time, vertical distance dived, and diving



intensity. Dive duration was the least variable and vertical distance dived was the most variable among individual seals. The results were used to estimate the sample sizes required to detect—with acceptable precision and power—differences in the six measures between sites, years, or species. These results emphasize that specifying the magnitude of the (inter-annual, intersite or interspecific) difference that is biologically significant to the study population is an important, though sometimes difficult, component of TDR survey design. (Auth. mod.)

#### B-56530

Davenport, J., MacAlister, H., **Environmental conditions and physiological tolerances of intertidal fauna in relation to shore zonation at Husvik, South Georgia**, *Marine Biological Association of the United Kingdom. Journal*, Nov. 1996, 76(4), p.985-1002, 52 refs.

The study reported here was designed to investigate intertidal environmental conditions at Husvik Harbour, South Georgia, and to assess the environmental tolerances of as wide a variety of intertidal animals as possible, relating those tolerances to position on the shore. Intertidal zonation patterns have attracted a great deal of study. However, a study at South Georgia was thought to be valuable for the following reasons: South Georgia is extremely isolated (1300 km from the nearest land) and the intertidal zone has only existed for 10,000-14,000 years; at earlier times the island was covered by an extensive ice cap that reached far out to sea. In consequence of its isolation and recent origin, the fauna of South Georgian shores provides a large-scale example of what has been described as 'The Paradox of Rockall' (Johannesson, 1988); the bulk of the sedentary intertidal fauna is made up of brooders or direct developers, rather than species featuring pelagic larvae. (Auth. mod.)

#### B-56538

Hazra, A.K., **Study of the population ecology of soil nematode fauna in relation to some edaphic factors in Schirmacher Oasis, Antarctica**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.65-90, Refs. p.89-90.

The effects of some physico-chemical soil factors on the distribution of soil nematode fauna have been studied in the Schirmacher Ponds. Five genera of nematodes, *Tylenchorhynchus*, *Drylaimellus*, *Aporcelaimellus*, *Dorylaimoides*, and *Paramylonchulus* were recorded for the first time from this area. Altogether 30 stations, among 15 study sites, were chosen for sampling during the study period from Jan. 3-Feb. 30, 1990. The population of nematodes, including juveniles, was maximum (22.27%) on Jan. 27 and minimum (2.38%) on Feb. 25. The maximum population was obtained from the site 15 (11.62%). Nematode genus *Tylenchorhynchus* was the most dominant taxa, comprising 41.45% of the total population. The vertical distribution study for all 4 genera revealed maximum faunal composition to be in the upper 0.5 cm depth. The physico-chemical factors of soil (temperature, relative humidity, nitrate, pH and organic carbon) were also studied. Peak population was associated with the higher levels of temperature, nitrate, organic carbon and relative humidity. (Auth. mod.)

#### B-56539

Ramaiah, N., Kodagali, J., Nair, S., Sheelu, G., Chandramohan, D., **Heterotrophic activity, bacterial types and abundance in different ecosystems of the Queen Maud Land**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.91-106, Refs. p.104-106.

Microbiological studies from the marine, limnetic, terrestrial and glacial ecosystems were carried out in Queen Maud Land (1989-90) to determine bacterial numbers and the generic types, and also to estimate the uptake of  $^{14}\text{C}$  glucose and glutamic acid by these heterotrophs. Bacterial communities in different habitats appeared to be having distinct ecosystem specialization, both in terms of number and activity. In the maritime Antarctic, their biomass was found to be substantially high. Vertical profiles of bacterial counts biomass decreased gradually and uniformly with increasing depth in the polynyas. A higher recovery of viable population from 100 m was seen in the pelagic waters within the Antarctic Convergence. Distribution of bacterial populations in freshwater, terrestrial and glacial habitats in the Schirmacher Ponds showed a remarkable ecological

adaptation. They were more abundant in the habitats where there was accumulation of organic matter. Results of these studies are discussed, with emphasis on the role of microbial population in the oxidation and biotransformation of organic matter and in the trophodynamics of the antarctic regimes. (Auth. mod.)

#### B-56540

Ramaiah, N., **Production of certain hydrolytic enzymes by psychrophilic bacteria from antarctic krill, zooplankton and seawater**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.107-114, 20 refs.

Psychrophilic bacteria isolated from krill, zooplankton and water samples collected in the Indian Ocean in 1989-1990, were enumerated and several strains subjected to various biochemical tests. Presence of different enzymes was examined from about 500 of these strains. Bacterial numbers were the highest in the krill gut samples; moderate on zooplankton surfaces and low in water and the ice samples. *Pseudomonas*, *Vibrio*, *Chromobacterium*, *Aeromonas*, *Acinetobacter* and *Moraxella* were the genera among the Gram-negative organisms. Nearly 8% of the isolates were Gram-positive and over 15% were unidentifiable. Notably, the bacterial strains collected from zooplankton were found to possess large number of hydrolytic enzymes compared to those strains collected either from water or krill samples. Based on these results, the functional role of bacterial enzymes in relation to trophodynamics of euphausiids and their role in the post-harvest technology of krill is discussed. (Auth.)

#### B-56551

Sathe, A.P., **Baseline data on natural radioactivity and trace metal concentration in natural antarctic samples**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.251-257, 2 refs.

The antarctic environment can be expected to provide a reference level for environmental and pollution studies due to its remoteness and restricted human activities. The Ninth Indian antarctic expedition collected background baseline data on natural radioactivity and trace heavy metal concentrations in air, water and rock samples. It also measured background gamma dose rate in air and tritium levels in the ocean as well as in antarctic fresh waters. The observations made during this expedition and the results of the analyses on the samples collected are presented in this report. (Auth.)

#### B-56561

Anderson, T.L., Charlson, R.J., **Geophysics of natural marine sulfate aerosols**, *Atmospheric environment*, 1991, 25A(11), p.2445-2447, 34 refs.

#### DLC TD881.A818

The hypothesis suggesting dimethyl sulfide (DMS) from oceanic phytoplankton as the dominant natural worldwide source of cloud condensation nuclei (CCN) is being tested in several ways. Studies ranging from the perturbation of cloud albedo by ship plumes to the sulfur content of antarctic ice cores have revealed much about the workings of the natural marine sulfur cycle and the mass flux of DMS-derived sulfur compounds. However, quantifying the relationship between DMS mass flux, or sulfate mass concentration, and CCN number remains as a major challenge. (Auth.)

#### B-56564

Eckelbarger, K.J., Larson, R., **Ultrastructure of the ovary and oogenesis in the jellyfish *Linuche unguiculata* and *Stomolophus meleagris*, with a review of ovarian structure in the Scyphozoa**, *Marine biology*, Dec. 1992, 114(4), p.633-643, 33 refs.

#### DLC QH91.A1 M35

Ovarian structure and oogenesis has been examined in six scyphozoan species including the semeanostome *Diplumularis antarctica* Maas, 1908 (collected in 1987 in McMurdo Sound), the rhizostomes *Cassiopea xamachana* Bigelow, 1892 (collected in Belize in 1988), and *Stomolophus meleagris* L. Agassiz, 1862 (collected in Ft. Pierce Inlet in 1988), and the coronates *Periphylla periphylla* (Peron and Lesueur, 1810), *Nausithoe atlantica* Broch, 1914 (both collected in the Bahamas in 1988), and *Linuche unguiculata* (Schwartz, 1788) (collected in Nassau Harbor,



Bahama Islands in 1989). Based on these findings and information on five other scyphozoan species from additional literature sources, at least two fundamentally different types of ovaries exist in the Scyphozoa. The present study suggests that scyphozoans were among the first metazoans to develop ovarian accessory cells during their reproductive evolution. The trophocyte-oocyte association observed in some scyphozoans is similar to but structurally less complex than the trophonema-oocyte association described from anthozoans. Scyphozoan ovarian morphology helps support the view that the Scyphozoa share a closer phylogenetic relationship with the Anthozoa than with the Hydrozoa. (Auth. mod.)

#### B-56568

Froneman, P.W., Pakhomov, E.A., Perissinotto, R., McQuaid, C.D., **Role of microplankton in the diet and daily ration of antarctic zooplankton species during austral summer**, *Marine ecology progress series*, Nov. 14, 1996, 143(1-3), p.15-23, 64 refs.

Predation rates of the 9 most abundant antarctic meso- and macrozooplankton species on microplankton were estimated using *in vitro* incubations during the fourth cruise of the South African Antarctic Marine Ecosystem Study to the ice-edge region of the Lazarev Sea during 1994-95. Based on previously published results, meso- and macrozooplankton species generally consumed >120% of their minimum daily ration. Microplankton carbon contributed between 17 and 24% of the total carbon requirements for the 4 copepod species examined and between 21 and 73% for the macrozooplankton. The daily rations of juveniles were, however, twice those of the adults, suggesting that the relative importance of microzooplankton to the daily ration of macrozooplankton shifts with life stage. Carnivory by metazoan grazers may, therefore, potentially reduce the high grazing impact of microzooplankton on the local phytoplankton stock. (Auth. mod.)

#### B-56577

Clarke, A., Leakey, R.J.G., **Seasonal cycle of phytoplankton, macronutrients, and the microbial community in a nearshore antarctic marine ecosystem**, *Limnology and oceanography*, Sep. 1996, 41(6), p.1281-1294, Refs. p.1292-1294.

Seawater chlorophyll *a* concentration and temperature have been measured weekly from Dec. 1988 to Aug. 1994 at a nearshore shallow-water station at Signy I. in the maritime Antarctic. Macronutrients were measured monthly, and the microbial community was enumerated during a 15-month period. The duration of winter sea-ice, summer seawater temperature, and peak chlorophyll biomass all exhibited strong interannual variability. Seasonal macronutrient patterns suggested a preferential utilization of ammonium at the start of spring followed by a major utilization of nitrate by the summer diatom bloom. The microbial community was complex and showed a clear seasonality in all components, although the timing of the summer bloom differed between taxa. This study emphasizes the complex nature of the nearshore marine ecosystem and highlights the need for year-round oceanographic studies in the highly seasonal polar marine environment. (Auth. mod.)

#### B-56579

Hofmann, E.E., Capella, J.E., Ross, R.M., Quetin, L.B., **Models of the early life history of *Euphausia superba*-Part I. Time and temperature dependence during the descent-ascent cycle**, *Deep-sea research*, July/Aug. 1992, 39(7/8A), p.1177-1200, 42 refs.

#### DLC GC1.D25

A time- and temperature-dependent model was developed to simulate the descent-ascent behavior of the embryos and early larval stages of the antarctic krill, *Euphausia superba*. This model combines laboratory measurements of temperature effects on developmental times, density and physiology of krill embryos and larvae and the observed water temperature structure in the Bransfield Strait-South Shetland Islands region. Simulations with observed vertical temperature profiles from this region show that embryos that develop at temperatures less than 0°C hatch relatively deep (approx. 1000 m) or hit the bottom before hatching. The presence of warm (1-2°C) Circumpolar Deep Water (CDW), between 200 and 700 m, results in hatching depths of about 700 m. The sinking rate pattern characteristic of the embryos of *E. superba* retains the embryos in the CDW, where development is accelerated. Larval ascent rate through the CDW is rapid, so larvae reach the surface before metamorphosing into the first

feeding stage, and have sufficient carbon reserves to drift at the surface for several weeks before needing to find food. These results suggest that the sinking rate pattern characteristic of embryos of krill may be part of a reproductive strategy that evolved in response to the thermal structure of its environment. (Auth. mod.)

#### B-56580

Capella, J.E., Quetin, L.B., Hofmann, E.E., Ross, R.M., **Models of the early life of *Euphausia superba*-Part II. Lagrangian calculations**, *Deep-sea research*, July/Aug. 1992, 39(7/8A), p.1201-1220, 44 refs.

#### DLC GC1.D25

Lagrangian calculations show that: (1) surface flow is the primary factor influencing the final location of the embryo-larva particle; and (2) timing of krill spawning affects the eventual position of the feeding larvae. Seasonal changes in the wind stress field result in variability in direction and velocity of surface currents, which affects the embryo-larva trajectories. Conditions favorable for the transport of larvae to Bransfield Strait occur early in the spawning season. East of the Antarctic Peninsula larvae have a greater probability of entering Bransfield Strait if the krill embryos are released in mid-summer, Jan. to Feb. Embryos released to the north of the South Shetland Is., west of 62°W are transported into Drake Passage. Embryos released to the north of the South Shetland Is. and east of Livingston I. are transported westward where they can eventually enter Bransfield Strait. Krill larvae also are transported into Bransfield Strait from the Bellingshausen and Weddell seas. The Lagrangian trajectories show that the western Bransfield Strait is a region of potentially high larval concentration due to transport from surrounding areas as well as local production. This is in agreement with observed krill larvae distributions, which show higher concentrations in this region. (Auth. mod.)

#### B-56615

Pant, A., **Primary and extracellular production during austral summer at 70°S, 12°E, Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.311-320, 20 refs.

#### DLC G850.I53 I53

The data presented here was collected during the Fifth Indian Expedition to Antarctica, 1985-86. Much of the <sup>14</sup>C radioactivity supplied as NaH<sup>14</sup>CO<sub>3</sub> accumulates in the low molecular weight fraction of the particulate matter, into polysaccharides and proteins; there was little radioactivity in the lipid component. Phytoplankton exudation showed a significant decline with greater depth within the euphotic column. The quality of material exuded also varied. In some cases, a greater amount of amino acids was released whereas in other cases organic acids formed the greater fraction. These data are discussed in relation to physical oceanographic factors. (Auth.)

#### B-56616

Dhargalkar, V.K., Bhosle, N.B., **Short term variation in particulate organic matter in the shelf waters of the Princess Astrid Coast, Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.321-330, Refs. p.329-330.

#### DLC G850.I53 I53

Particulate matter, collected at a single station in the shelf waters of Princess Astrid Coast during Jan.-Feb. 1986, was analyzed for phytoplankton biomass (Chl *a*), living carbon (ATP-C), particulate organic carbon (POC) and its constituent fractions, including particulate carbohydrates (PCHO), particulate proteins (PP) and particulate lipids (PL). Chl *a*, ATP and POC varied from 0.051 to 3.1, 0.33 to 1.81 and 305 to 1850 µg/l, respectively; PCHO, PP and PL ranged from 8 to 176, 22 to 132 and 8 to 209 µg/l, respectively. Data on these parameters showed large day to day variations and suggest patchy distribution. (Auth.)

#### B-56617

Dhargalkar, V.K., **Seasonal variation in particulate organic matter and its constituent fractions under the ice covered sea near the shelf, Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi,



India, Department of Ocean Development, 1988, p.331-339, Refs. p.337-339.

#### DLC G850.I53 I53

Particulate organic matter (POM) collected at a single station in the shelf waters of Princess Astrid Coast from May to Dec. 1986 was analyzed for chl *a*, POC and other constituent fractions at 3 discrete depths. Chl *a* concentration at all the 3 depths varied from 0.026 to 0.253 µg/l showing minimum values during Aug.-Sep. POC values varied from 280 to 1058 µg/l while its constituent fractions such as particulate carbohydrates (PCHO), particulate proteins (PP) and particulate lipids (PL) varied from 14 to 193, 6 to 200 and 8 to 174 µg/l, respectively. Significant correlation existed between POC and chl *a*, PP and PL at 10 m depth. This was in contrast to PCHO and chl *a*. The components studied showed seasonal variation suggesting that the sea ice microalgae and planktonic organisms contribute substantially to particulate organic carbon. (Auth.)

#### B-56618

Dayal, H.M., Tandon, G.P., Tewari, K.C., Mehta, K., Pandey, R.S., Pant, H.C., **Studies on the effect of antarctic environment on some saprophytic tropical fungi**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.341-349, 8 refs.

#### DLC G850.I53 I53

Ten strains of saprophytic tropical fungi were exposed to the antarctic environment at the Dakshin Gangotri Station for 14 months, with a view to study the effect of extreme climatic variations on their survival, rate of growth and virulence. The data obtained suggested slight changes in the activity of a few types. No major variations were observed in any of the exposed strains. (Auth.)

#### B-56629

Joshi, M.C., Banerjee, B.K., **Prospects of horticulture in Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.473-487, 23 refs.

#### DLC G850.I53 I53

Horticultural experiments to cultivate some vegetables indoors were initiated during the 5th Indian expedition, at Dakshin Gangotri and Maitri stations. Plants grew well at both places, showing that the local soil is as good as the Indian soil. Preliminary surveys revealed that it is possible to obtain congenial indoor temperature. The indoor lighting and solar illumination were found to be inadequate. These, however, could be brought to the required level by the necessary adjustments. (Auth.)

#### B-56631

Zuñiga, G.E., Alberdi, M., Corcuera, L.J., **Non-structural carbohydrates in *Deschampsia antarctica* Desv. from South Shetland Islands, Maritime Antarctic**, *Environmental and experimental botany*, Dec. 1996, 36(4), p.393-399, 31 refs.

*Deschampsia antarctica* Desv. (Angiosperm: family Gramineae) plants were collected from Robert I., South Shetland Is., during Feb. 1992 and Jan. 1993 and were extracted with 80% ethanol. Total soluble sugars were analyzed in leaves and roots by colorimetric and HPLC techniques. Compared with other gramineae, the levels of sucrose and fructans were higher. These substances reached their maximum levels by the end of summer. The levels of sucrose and fructans found in Feb. 1992 were twice the level found in Jan. 1993. The unusually high accumulation of sucrose and fructans may be one of the protective mechanisms against low temperature that has allowed *D. antarctica* to grow in the maritime Antarctic. (Auth. mod.)

#### B-56647

Sreepada, R.A., Jayasree, V., Parulekar, A.H., **Benthic faunal composition along Princess Astrid Coast, East Antarctica**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.181-185, Refs. p.184-185.

One hundred seventy-nine species, representing 9 major benthic faunal groups encountered at 200 m depth off the Princess Astrid Coast are described. Estimated benthic biomass was 68/gm<sup>2</sup>. Echinoderms (35%)

followed by sponges (22%), molluscs (15%), ascidians (8%), coelenterates (5%), crustaceans (5%), bryozoans (4%) and annelids (3%) were the major faunal taxa. (Auth.)

#### B-56649

Dhaulakhandi, A.B., Joshi, R.P., Joshi, M.C., **Growth and yield of fenugreek (*Trigonella foenum graecum* L.), spinach (*Spinacea oleracea* L.), coriander (*Coriandrum sativum* L.) and lettuce (*Lactuca sativa* L.) under continuous daylight condition in Antarctica**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.195-208, Refs. p.206-208.

A study on growth and yield of fenugreek (*Trigonella foenum graecum* L.), spinach (*Spinacea oleracea* L.), coriander (*Coriandrum sativum* L.) and lettuce (*Lactuca sativa* L.) during the summer of 1990-91 is described. The plants, grown in peatmoss using nutrient film technique culture, maintained a good growth and crops matured within five weeks of emergence. Flowering was observed in fenugreek, coriander and spinach after 33, 27 and 34 days of emergence, respectively, while no flowering was observed in lettuce. The yields recorded were fenugreek 0.775 kg/m<sup>2</sup>, spinach 1.007 kg/m<sup>2</sup>, coriander 1.317 kg/m<sup>2</sup> and lettuce 0.888 kg/m<sup>2</sup>. The growth analysis was carried out by computing relative growth rate, relative leaf area, net assimilation rate, and leaf area ratio. Significant correlation between fresh weight (FW) and leaf area (LA) was observed. Exponential regression equations between FW and LA calculated for all four crops are described. Performance of 6 spinach genotypes was evaluated. Four highly yielding cultivars were Olympia, Barker, Jobnergreen and St. Halens, with green leaf yields of 1.350, 1.110, 1.063 and 0.900 kg/m<sup>2</sup>, respectively. (Auth. mod.)

#### B-56650

Dhaulakhandi, A.B., Joshi, R.P., Joshi, M.C., **Study on growth and development of five leguminous plant species: gram (*Cicer arietinum*), peas (*Pisum sativum*), lobia (*Vigna cinensis*), mung (*Phaseolus aureus*) and rajma (*Dolichos lablab*) in antarctic soil during polar day**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.209-217, 17 refs.

Results of a study on growth and development of 5 leguminous plant species—gram, peas, lobia, mung and rajma—carried out at Maitri Station during the austral summer of 1990-1991, using antarctic soil, are discussed. Growth analysis shows poor results. Flowering and seed formation in peas occurred between 34 and 40 days after sowing. Average values of weekly increase in plant height and leaf area for all crops are presented. It is concluded that antarctic soil is unsuitable for growing crops. Use of some other growing media, such as peatmoss, vermiculite, or rockwool/hydroponics, is recommended. (Auth. mod.)

#### B-56651

Pandey, K.D., Kashyap, A.K., **Diversity of algal flora in six fresh water streams of Schirmacher Oasis, Antarctica**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.219-229, Refs. p.228-229.

Algae and cyanobacteria (blue-green algae) flora of 6 freshwater streams of the Schirmacher Ponds was investigated. Over 30 species of algae predominantly belonging to cyanobacteria were recorded. Cyanobacteria contribution by N<sub>2</sub>-fixing species (both heterocystous and unicellular aerobic diazotrophs) was more than 50%, and their distribution was abundant in the middle of the stream. Composition of cyanobacteria and algal flora varied in different streams and species diversity was maximum in streams which supported the highest number of species. (Auth. mod.)

#### B-56652

Joshi, R.P., **Polar horticulture report of Tenth Antarctic Expedition**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.231-249, 29 refs.

Establishment of a hydroponic system for growing vegetables in a greenhouse at Maitri Station, and performance of different vegetables grown during the summer of 1990-1991, are discussed. Tomato was the



main crop in hydroponics; other crops were grown in peat moss. Successful production of tomato, cucumber, chilli, lettuce, coriander, methi and spinach is reported. (Auth. mod.)

### B-56658

Lee, R.E., Jr., **Principles of insect low temperature tolerance**, Insects at low temperature, edited by R.E. Lee, Jr. and D.L. Denlinger, New York, NY, Chapman and Hall, 1991, p.17-46, Selected refs. p.41-46.

**DLC QL599.82.I57 1990**

In this chapter the fundamental concepts and terms related to insect cold-hardiness are introduced. Specifically, the focus is on the nature of injury due to low-temperature exposure and freezing, and insect responses, including processes related to the regulation of supercooling, ice nucleation, freezing, cold hardening, and cryoprotection. The tremendous diversity of cold hardiness in insects and terrestrial arthropods is illustrated in a table. Cold hardiness or cold tolerance refers to the capacity of an organism to survive exposure to low temperature. A variety of factors are known to influence this capacity, including the stage of development, genetic potential, season, duration of exposure, nutritional status, and the thermal history. Cold hardening is the acquisition of enhanced cold tolerance through biochemical and physiological processes. Included in the discussions are some antarctic insects and parasitic arachnids. (Auth. mod.)

### B-56659

Sømme, L., Block, W., **Adaptations to alpine and polar environments in insects and other terrestrial arthropods**, Insects at low temperature, edited by R.E. Lee, Jr. and D.L. Denlinger, New York, NY, Chapman and Hall, 1991, p.318-359, Refs. p.352-359.

**DLC QL599.82.I57 1990**

Insects and other terrestrial arthropods use several techniques to adapt to alpine and polar environments. Unfavorable climatic conditions drastically reduce the number of species. The timberlines of the alpine regions and of the Arctic in the north abruptly mark a change in environmental conditions. Because of the isolated position of the Antarctic, its fauna is even poorer in number of species, and hence diversity is low. To limit the topic, this chapter mainly reviews the adaptation of terrestrial arthropods found beyond the limits of forests and focuses on the different factors that contribute to the overall adaptational strategies of different species. A comparison is made of the adaptational strategies of alpine, arctic, and antarctic terrestrial arthropods. Traditionally, species from these three regions are treated separately, although they are faced with similar problems of survival. By comparing adaptations that have evolved in species from all three environments, a better understanding of their adaptational strategies may be gained.

### B-56666

Cruwys, E., Robinson, K., Boyd, I.L., **Measurements of calcium and phosphorus concentrations in the neonatal dentine of Weddell and crabeater seals using energy-dispersive x-ray analysis**, *Polar record*, Jan. 1997, 33(184), p.21-28, Refs. p.27-28.

Concentrations of calcium and phosphorus were measured in the neonatal dentine of 11 crabeater and 11 Weddell seal postcanine teeth with an energy-dispersive x-ray analyzer. The extent of variation in elemental concentrations in different parts of the tooth, differences between species and individuals, and whether variation in elemental concentrations can provide information about dentine deposition mechanisms were assessed. No consistent patterns in elemental deposition in different parts of the tooth were found, but there were differences in concentrations between and within species. Post-natal dentine is composed of layers that appear alternately bright and dark in backscattered electron images. The elemental composition of neonatal dentine was closer to the dark bands than to those that appeared bright. It is suggested that the composition of neonatal dentine is more similar to the dark than the bright layers of dentine because of nutritional stresses that were occurring during mineral deposition. (Auth.)

### B-56670

Splettstoesser, J., **Mortality among chicks in the emperor penguin (*Aptenodytes forsteri*) colony at Riiser-Larsen Ice Shelf, Antarctica**, *Polar record*, Jan. 1997, 33(184), p.63-64, 8 refs.

Multiple visits were made to each of two emperor penguin (*Aptenodytes forsteri*) colonies in the eastern Weddell Sea in Nov. and Dec. 1994 and 1995. On the Nov. 19, 1994 visit to the Riiser-Larsen colony, many (approx. 1000) dead chicks were observed, nearly all lying singly on the snow and separated from each other by one or more meters. The random spacing of the dead chicks is consistent with the possibilities either of starvation or that they were with their parents when a storm struck, and the chicks froze to death, whereas the parents survived and walked away. No dead adults were observed. Nearly all dead chicks observed on Nov. 19 had been covered by later snowfall or blown snow on a revisit to the colony on Dec. 9, 1994, and few, if any, more recently dead chicks were observed. (Auth. mod.)

### B-56672

Kato, A., Naito, Y., Watanuki, Y., Shaughnessy, P.D., **Diving pattern and stomach temperatures of foraging King Cormorants at subantarctic Macquarie Island**, *Condor*, Nov. 1996, 98(4), p.844-848, 12 refs.

In a study conducted at the Handspike Point colony on subantarctic Macquarie I. in Jan. 1994, the diving depth and stomach temperatures of free-ranging King Cormorants (*Phalacrocorax albiventer*) were recorded using micro data loggers with the goal of quantifying the variability between the top and bottom stomach temperatures and comparing methods to estimate meal mass in free-ranging seabirds. The advantage of using two temperature sensors on the top and bottom of the loggers, and the problems in determining the feeding activities of seabirds from their stomach temperature is reported. (Auth. mod.)

### B-56673

Holberton, R.L., Helmuth, B., Wingfield, J.C., **Corticosterone stress response in Gentoo and King Penguins during the non-fasting period**, *Condor*, Nov. 1996, 98(4), p.850-854, 24 refs.

As part of a larger study on the ecology and endocrinology of seabirds wintering in the southern ocean, the authors captured and sampled two species of penguins during the non-fasting season to determine if they, like other species, exhibit the acute corticosterone stress response to capture and handling. This study was conducted aboard the NSF Research Vessel/ Ice Breaker *Nathaniel B. Palmer* during the winter months of May and June 1993, in the waters off of South Georgia. (Auth. mod.)

### B-56675

Penrith, M.L., Huchzermeyer, F.W., De Wet, S.C., Penrith, M.J., **Concurrent infection with *Clostridium* and *Plasmodium* in a captive king penguin, *Aptenodytes patagonicus***, *Avian pathology*, 1994, 23(2), p.373-380, With French, German and Spanish summaries. Refs. p.378-379.

Concurrent infection with *Plasmodium relictum* and *Clostridium perfringens* Type B was diagnosed in a king penguin (*Aptenodytes patagonicus*) that died in the National Zoological Gardens, Pretoria. Macro- and microscopic pathological changes were mainly due to *C. perfringens*. The relative significance of the two pathogens is discussed. (Auth.)

### B-56676

McFarlane, R.A., **Some observations on Adelie penguin (*Pygoscelis adeliae*) mortality in East Antarctica**, *Avian pathology*, Mar. 1996, 25(1), p.187-190, With French, German and Spanish summaries. 6 refs.

The postmortem findings of an adult male Adélie penguin found at Magnetic I. demonstrating a premortem wound in addition to those consistent with an attack and scavenging by south polar skuas, are described. Other causes of mortality are discussed. (Auth.)

### B-56677

Boström, S., **Populations of *Plectus acuminatus* Bastian, 1865 and *Panagrolaimus magnivulvatus* n. sp. (Nematoda) from nunataks in Dronning Maud Land, East Antarctica**, *Fundamental and applied nematology*, 1995, 18(1), p.25-34, With French summary. 17 refs.

Populations of *Plectus acuminatus* Bastian, 1865 and *Panagrolaimus magnivulvatus* n.sp. from Queen Maud Land are described from studies by light and scanning electron microscopy. The populations of *Plectus* found



are close to *P. acuminatus*, *P. antarcticus* de Man, 1904 and *P. cirratus* Bastian, 1865 and their identity is discussed. Additional information on the morphology of *P. acuminatus* is provided. The new species of *Panagrolaimus* is separated from other species of the genus by the extreme development of the vulval lips, especially the anterior lip. It is further separated from the most closely related species, *P. superbus* Fuchs, 1930, by a larger corpus/isthmus-ratio and a more posterior position of the phasmids in the females, and larger spicules in the males. (Auth.)

#### B-56678

Petz, W., Foissner, W., **Morphology and morphogenesis of *Lamtostyla edaphoni* Berger and Foissner and *Onychodromopsis flexilis* Stokes, two hypotrichs (Protozoa: Ciliophora) from antarctic soils**, *Acta protozoologica*, 1996, 35(4), p.257-280, Refs. p.279-280.

The morphology and morphogenesis of *Lamtostyla edaphoni* Berger and Foissner, 1987 and *Onychodromopsis flexilis* Stokes, 1887 were investigated using silver impregnation and scanning electron microscopy. Stomatogenesis of *L. edaphoni* commences apokinetally near the leftmost transverse cirrus, like in *L. perisincirra*, *L. hyalina* and *L. australis* nov. comb. This distinguishes *Lamtostyla* from *Amphisiella*, whose oral primordium originates parakinetally from the amphisiellid median cirral row (ACR). Five cirral anlagen develop. Based on the data, improved definitions are given for all amphisiellid genera. *Onychodromopsis flexilis* is redescribed emphasizing somatic variation and the fine structure of the oral apparatus. It has cortical granules and an oxytrichid FVT-cirral pattern but two to three right and one to two left marginal rows. The morphogenetic processes are very similar to those of *Oxytricha granulifera*. The data show that *O. flexilis* belongs to the Oxytrichidae and is closely related to *Oxytricha*. (Auth. mod.)

#### B-56682

Patarnello, T., Bargelloni, L., Varotto, V., Battaglia, B., **Krill evolution and the antarctic ocean currents: evidence of vicariant speciation as inferred by molecular data**, *Marine biology*, Oct. 1996, 126(4), p.603-608, 33 refs.

The phylogenetic relationships of the antarctic krill *Euphausia superba*, the key species in the antarctic food web, and other antarctic and subantarctic euphausiids have been investigated using the 16S ribosomal mitochondrial gene. The phylogenetic reconstructions indicated that the antarctic species form a monophyletic clade separated by the non-antarctic species. The results revealed a large genetic divergence between the antarctic and subantarctic species. The time of separation between these species, estimated from the molecular data, is around 20 mya, which is comparable with the geological time of the formation of a circum-antarctic water circulation and the Antarctic Polar Frontal Zone. The euphausiid molecular phylogeny therefore represents evidence for vicariant speciation. (Auth. mod.)

#### B-56684

Dziurdzik, B., **Hair histological structure in southern elephant seals** [Budowa histologiczna włosów skóry morskiego, *Mirounga leonina* (Linnaeus 1758) (Pinnipedia, Mammalia)], *Przegląd zoologiczny*, 1989, 33(3), p.449-452, In Polish with English summary. 17 refs.

#### DLC QL1.P7 1989

The paper contains a histological description of the hair of the southern elephant seal, *Mirounga leonina* (Linnaeus, 1758) (Pinnipedia, Mammalia). The material used in this study was collected in the years 1978-79 in the Antarctic. The hair of the southern elephant seal contains no medulla, it is short and tape-like flattened, with mosaic cuticular scale pattern and a narrow, elliptical cross-section. It is a shield hair. Distinct differences in the histological structure of the hair between the southern elephant seal and other Pinnipedia, especially *Otariidae*, were found. The structure of the hair was studied by means of a light microscope (structure of hair medulla) and a scanning microscope (pattern of cuticular scales). (Auth.)

#### B-56689

Eppley, Z.A., **Charadriiform birds in Antarctica: behavioral, morphological and physiological adjustments conserving reproductive success**, *Physiological zoology*, Dec. 1996, 69(6),

p.1502-1554, Refs. p.1546-1554.

Comparative analyses were used to elucidate the changes in parental behavior and in the rate of development of the young associated with successful breeding of charadriiform birds in Antarctica. The species studied, the kelp gull *Larus dominicanus*, the South Polar skua *Catharacta macormicki*, and the greater sheathbill *Chionis alba*, brooded their young 2-5 times longer than did their temperate relatives. The antarctic young had greater tolerance to hypothermia; the hatchlings were neither larger nor metabolically more mature than their relatives. Despite presumed selection on the young by low temperatures and the presence of individual variation in development, the young did not attain homeothermy significantly earlier than did their temperate relatives. Growth rates over the entire nestling period were also similar for antarctic and temperate species. The antarctic young did grow faster to a moderate size more favorable for thermoregulation and showed coordinately faster development of resting metabolic rate. South Polar skuas further diverged in having accelerated development of thermogenesis, which substantially reduced their reliance on parental brooding. Evolutionary changes in physiological development of the young have resulted in improved abilities to tolerate hypothermia and in lower costs, relative to peak metabolic rates, to maintain homeothermy. (Auth. mod.)

#### B-56695

Huin, N., **Prolonged incubation in the Black-browed Albatross *Diomedea melanophrys* at South Georgia**, *Ibis*, Jan. 1997, 139(1), p.178-180, 11 refs.

Abnormally prolonged incubation periods are rarely reported amongst surface-nesting Procellariiformes, presumably because if intermittent incubation was involved the likelihood of egg predation would be high. However, careful examination of laying and hatching dates may be necessary to reveal the extent of unusually long incubation periods occurring in surface-nesting Procellariiformes. Reported here are two cases of abnormally long (but successful) incubation periods in Black-browed Albatross *D. melanophrys* at South Georgia, one readily recognized at the time, the other only evident because of detailed data on laying and hatching dates. At Bird I., South Georgia laying and hatching dates at 110 nests in a study colony of Black-browed Albatrosses were recorded in the 1992-93 breeding season. (Auth. mod.)

#### B-56696

Webby, R.F., Markham, K.R., Smith, R.I.L., **Chemotypes of the antarctic moss *Bryum algens* delineated by their flavonoid constituents**, *Biochemical systematics and ecology*, July 1996, 24(5), p.469-475, 20 refs.

The flavonoid composition of *Bryum algens* from Antarctica is presented. It is shown that there exist two extreme patterns, with a range of intermediate forms. The patterns range from a flavonol dominant one, containing some flavone glycosides, through to a flavone dominant pattern essentially lacking flavonols. The close proximity of plants with different flavonoid profiles, and the presence of plants with intermediate patterns, suggest the existence of chemotypes within this species. (Auth.)

#### B-56697

Virtue, P., Nichols, P.D., Nicol, S., Hosie, G., **Reproductive trade-off in male Antarctic krill, *Euphausia superba***, *Marine biology*, 1996, 126(3), p.521-527, Refs. p.526-527.

Freshly caught male and female *Euphausia superba* from the same swarm exhibited different rates of mortality subsequent to capture. Mortality was significantly higher for reproductive males than for females within the first 3 d of capture. Total lipid and triacylglycerol levels in male, female and juvenile *E. superba* were analyzed and compared. All reproductive male krill analyzed from this swarm had low lipid levels with negligible triacylglycerol stores. Somatic lipid stores in female and juvenile krill ranged from 8 to 30%, of which up to 40% was triacylglycerol. The levels of algal sterols in the digestive gland of males, females and juveniles indicate that all krill had been feeding recently. An analysis of the sex ratio of krill catches derived from data collected over 7 summers from the Prydz Bay region showed a decrease in the proportion of males with increasing size. There was a sharp decline in numbers of male krill once they attained a length of 51 to 55 mm. Low lipid levels in reproductive male krill may be due to reproductive costs. The resulting low storage-lipid levels are accompanied by high mortality in male krill. (Auth.)



**B-56699**

Bayly, I.A.E., **Fusion of the genera *Boeckella* and *Pseudoboeckella* (Copepoda) and revision of their species from South America and sub-Antarctic islands**, *Revista chilena de historia natural*, Mar. 1992, 65(1), p.17-63, With Spanish summary. Refs. p.60-63.

**DLC QH7.R45 1992**

In considering the taxonomy of freshwater calanoid copepods, the genus *Pseudoboeckella* Mrázek 1901 is placed in synonymy with the genus *Boeckella* de Guerne and Richard 1889. Sixteen species (none of them new) from South America and subantarctic islands are recognized, and a key to the males of 15 of them presented. Of the 16 species, 14 occur in South America and two (*B. vrevicaudata* and *B. vallentini*) are restricted to subantarctic islands. *B. poppei* occurs both in South America and on antarctic islands. Descriptions and new figures of both sexes of all species are given, but doubts remain on the structure of the male of *B. longicauda*. Distribution maps are provided for all species occurring in South America. (Auth.)

**B-56700**

Peters, E., Thomas, D.N., **Prolonged darkness and diatom mortality. I: Marine Antarctic species**, *Journal of experimental marine biology and ecology*, Dec. 15, 1996, 207(1-2), p.25-41, Refs. p.39-41.

The effect of prolonged periods of darkness (up to 10 months) was investigated in the diatom species *Thalassiosira antarctica* Comber, *T. tumida* (Janisch) Hasle, *Porosira pseudodenticulata* (Hustedt) Jousé, *Proboscia inermis* (Castracane) Jordan and Ligowski and *Fragilariopsis kerguelensis* (O'Maera) Hustedt isolated from the southern ocean. Sudden darkness did not induce resting spore formation. All species survived in their vegetative stage. High levels of photosynthesis were resumed in *T. antarctica*, *T. tumida* and *P. inermis* upon re-exposure to light at all times tested during a 3 month dark period. Cellular chlorophyll *a*, carbon and nitrogen decreased at the beginning of the dark period and remained more or less stable suggestive of a low maintenance respiration. Species specific survival times varied from less than 4 months up to 9 months. After returning to the former light regime during the species specific survival times *T. antarctica*, *T. tumida*, *P. pseudodenticulata* and *P. inermis* began growing at rates similar to those in the pre-dark phase. (Auth.)

**B-56701**

Des Clers, S., Nolan, C.P., Baranowski, R., Pompert, J., **Preliminary stock assessment of the Patagonian toothfish longline fishery around the Falkland Islands**, *Journal of fish biology*, Dec. 1996, 49(Supplement A), p.145-156, 12 refs.

An experimental fishery for Patagonian toothfish *Dissostichus eleginoides* was opened in Falkland Is. waters briefly in 1992 and then from Apr. 1994. One to two longlines per vessel were usually deployed at night, mostly fishing for 12-30 h at depths between 600 and 2000 m. The characteristics of the vessel, gear, fishing activities and the data collection and analyses methods are described. An initial evaluation of toothfish biology and population dynamics in Falkland Is. waters is given. A first analysis of toothfish numbers caught in 1994 suggests that these are changing at rates faster than expected from simple demographic processes. Despite an intensive monitoring of catch and fishing effort of each vessel, it is still not possible to derive reliable estimates for the size of the toothfish population currently exploited in the area. The results, together with current and future lines of research, are discussed in the light of data available from other toothfish fisheries in austral waters. (Auth. mod.)

**B-56702**

Coggan, R.A., Nolan, C.P., George, M.J.A., **Exploratory deep-sea fishing in the Falkland Islands, south-western Atlantic**, *Journal of fish biology*, Dec. 1996, 49(Supplement A), p.298-310, 15 refs.

Twenty deep-water stations to the east and south of the Falkland Is. were sampled by commercial bottom trawl deployed at depth range of approximately 500-1000 m. Forty-one species of teleost fish were recorded, 10 species of elasmobranch and one species of agnathan. Different assemblages of fish were found to characterize each depth zone with diversity being greatest in the mid-zone and biomass greatest in the upper and lower zones. Some species occurred in all zones but showed depth-

related abundance. Four species accounted for 85% by weight of all fish caught. Quantitative sampling of selected species revealed depth-related variations in their population structure. Length-frequency analyses are presented for *Macrurus carinatus* and *Dissostichus eleginoides* and show a tendency for larger individuals to inhabit deeper water. Discard rates from the commercial catch were sometimes high, particularly for the smaller species, raising concerns about the impact of a fishery on by-catch species. The potential for deep-sea fisheries in Falkland waters is discussed and further studies are suggested in the light of developing oil, gas and fishing industries. The presence of some invertebrate taxa is recorded. (Auth. mod.)

**B-56703**

Yau, C., George, M.J.A., Coggan, R.A., Criado-Delgado, J.A., **Preliminary study of two species of flatfish (family: Bothidae) from the south-west Atlantic**, *Journal of fish biology*, Dec. 1996, 49(Supplement A), p.330-336, 5 refs.

A total of 251 *Mancopsetta maculata maculata* and 276 *M. milfordi* were sampled during deep-water exploratory fishing conducted in Nov. 1994 around the Falkland Is. at depths of 400-1000 m, using standard commercial bottom trawling gear. The two species were found to have similar geographical distributions and were often obtained at the same stations in depths of 400-900 m on the continental slope. *M. m. maculata* showed a uni-modal cohort structure with a modal length at the 29 cm total length size-class; males outnumbered females in a ratio of 3.5:1. *M. milfordi* showed a tri-modal length distribution, the main mode at the 37 cm total length size-class, with females outnumbering males in a ratio of 1.1:1. Length-weight relationships and length-at-age information are presented for the two species. Diet was determined from the analysis of stomach contents and, although the major prey type for both species consisted of crustaceans, the morid fish *Austrophycis marginata* also formed an important part of the diet of *M. milfordi*. (Auth. mod.)

**B-56705**

Young, P.S., Leta, A.C., **Antarctic Cirripedia (Crustacea) collected by the Brazilian Antarctic Program (1983-1986)**, *Iheringia série zoologia*, June 18, 1996, No.80, p.121-126, 13 refs.

Seven species of cirripeds were found in the Bransfield Strait: *Australscalpellum schizmatoplacianum* Newman & Ross, 1971, *Litoscalpellum compactum* (Borradaile, 1916) comb. n., *L. discoveryi* (Gruvel, 1906), *Anguloscalpellum angulare* (Cantel 1930) *Trianguloscalpellum liberum* (Nilsson-Cantell, 1930), *T. magnaecarinae* (Nilsson-Cantell, 1930) and *Brathylasma corolliforme* (Hoek, 1883). *Trianguloscalpellum compactum* is transferred to *Litoscalpellum* Newman & Ross, 1971, due to a reduction in the size of plates. Five of the species have their geographic distribution restricted to the Antarctic Peninsula; only *L. discoveryi* and *B. corolliforme* are more widely distributed in the Antarctic. (Auth.)

**B-56706**

Viñuela, J., et al, **Effect of hatching date on parental care, chick growth, and chick mortality in the chinstrap penguin *Pygoscelis antarctica***, *Journal of zoology*, Sep. 1996, 240(1), p.51-58, 16 refs.

The effect of hatching data on breeding performance (chick growth and mortality) and phenology (crèching and fledging ages) of the chinstrap penguin was studied during 3 years. Hatching data had slight or no effect on mortality and early growth, but was negatively correlated with crèching age, which, in turn, was positively related to final size. The decision to leave the chicks unguarded does not seem to be based on the condition of the chicks, but on that of adults. Fledging age was negatively correlated with hatching date, and this effect was more marked in the year with poor growth performance. Given the short time available for breeding in Antarctica, there must be conflicting pressures between investing in feeding chicks and advancing the period of premoult resource storage, this explaining the strong relationship between hatching dates and subsequent phenological events (crèching and fledging). (Auth. mod.)

**B-56707**

Everson, I., Kock, K.H., Parkes, G., **Ovarian development associated with first maturity in three Antarctic channichthyid species**, *Journal of fish biology*, Nov. 1996, 49(5), p.1019-1026, 18 refs.



It has been known for some time that yolk deposition and final ovarian maturation were prolonged processes for many antarctic fish. The adolescent phase in 3 species of channichthyid has been studied, based on an extensive series of samples over 5 seasons. Samples were obtained during a series of abundance estimation surveys on the shelf around South Georgia. Fish were measured, and sex and maturity stage determined from macroscopic examination of the gonads. It was found that for female *Champscephalus gunnari* and *Pseudochaenichthys georgianus* the adolescent phase lasts <1 year but in *Chaenocephalus aceratus* it lasts for nearly 4 years. (Auth.)

#### B-56708

Ling, H.U., **Snow algae of the Windmill Islands region, Antarctica**, *Hydrobiologia*, Oct. 25, 1996, 336(1-3), International Phycological Congress, 5th, Qingdao, China, June 1994. Proceedings. Workshop on Biogeography of Freshwater Algae, p.99-106, 26 refs.

A list of the 24 species of snow algae identified from the Windmill Is., a resume of what is currently known about the major species, and avenues for further research are provided. New species discovered include 2 *Desmotetra* spp., 1 *Chlorosarcina* sp., 2 *Chloromonas* spp. and a *Palmellopsis* sp. Several of these are from genera whose members have previously been found only in the soil flora. Not only was it necessary to elucidate the life cycle of these species, but it was also essential to examine them ultrastructurally to determine their taxonomic positions. (Auth. mod.)

#### B-56709

Kuznetsov, A.P., Pasternak, F.A., **Age and genesis of current benthic fauna: paleoceanography and paleoclimatology** [Vozrast i genezis sovremennoi glubokovodnoi donnoi fauny v svete predstavlenii o geologicheskoi istorii okeana i klimate zemli], *Rossiiskaia akademiia nauk. Izvestiia. Seriya biologicheskaya*, Mar.-Apr. 1992, No.2, p.255-261, In Russian with English summary. Refs. p.259-260.

#### DLC AS262.A6245 1992

The age, genesis and evolution of present deep-sea benthic populations are examined in the light of geological history of the ocean, paleoclimatology, bioevolutionary post-Proterozoic reconstructions and faunal composition. Current abyssal and ultra-abyssal oceanic faunas are defined as relatively young, of mainly Cenozoic formations. It is suggested that migration from shallow to deep, abyssal waters occurred after the faunal preadaptation to the cold-water life mode, and that the antarctic region plays a substantial role in the formation of post-Mesozoic deep-sea bottom fauna. (Auth. mod.)

#### B-56710

Sassi, R., Nascimento Melo, G. do, **Tintinnina (Protozoa-Ciliophora-Oligotrichida) from the Second Brazilian Expedition to the Antarctic**, *Revista brasileira de biologia*, May 1993, 53(2), p.311-325, With Portuguese summary. Refs. p.324-325.

#### DLC QH301.R43 1993

Twelve species of Tintinnina were obtained from plankton samples collected during the second Brazilian expedition to the Antarctic: *Amphorides laackmanni*, *Codonellopsis balechi*, *C. gaussi*, *Coxiella frigida*, *Cymatocylis affinis*, *C. antarctica*, *C. calyciformis*, *C. convallaria*, *C. drygalskii*, *C. vanhoeffeni*, *Laackmanniella naviculaefera* and *Tintinnopsis bacillaria*. The most abundant species were *C. gaussi*, *C. antarctica*, *C. convallaria*, and *L. naviculaefera*. The authors provide a systematic treatment only for *C. affinis*, *C. antarctica*, *C. calyciformis* and *C. frigida*. Drawings and measurements were furnished for all species. (Auth.)

#### B-56738

Eastman, J.T., De Vries, A.L., **Morphology of the digestive system of Antarctic nototheniid fishes**, *Polar biology*, Jan. 1997, 17(1), p.1-13, Refs. p.12-13.

Although antarctic nototheniid fishes are ecologically diverse, this survey of aspects of the anatomy and histology of the digestive system of 25 species showed little interspecific variation in the structure of this system. The gastrointestinal tract is illustrated and all but two species shared a similar pattern of intestinal coiling. Numerous hepatic ducts, contained

within the liver parenchyma, converged on the neck of the gall bladder. The bile duct penetrated the gut wall near the origins of the most dorsally located ceca. The terminal portion of the pancreatic duct paralleled, but did not join, the bile duct. The exocrine pancreas was diffuse and present in intercecal and splenic mesenteries, in the wall of the gall bladder and in tissue near the walls of the bile and pancreatic ducts. Unlike many other teleosts, the liver of nototheniids usually lacked pancreatic exocrine tissue. Nototheniids had a principal pancreatic islet (Brockmann body) and 2-3 accessory islets. Peritoneal melanism was a convergent feature of species living in the water column and probably served to screen the bioluminescence from gut contents. (Auth. mod.)

#### B-56739

Merino, S., Barbosa, A., **Haematocrit values in chinstrap penguins (*Pygoscelis antarctica*): variation with age and reproductive status**, *Polar biology*, Jan. 1997, 17(1), p.14-16, 25 refs.

Haematocrit variation with age and reproductive status was studied in chinstrap penguins (*Pygoscelis antarctica*) on Deception I. There was a significant difference in haematocrit values between different age groups (adults vs nestlings and juveniles). Adults had a higher haematocrit value than juveniles and nestlings and juveniles had higher haematocrit values than nestlings. There was also a significant difference in haematocrit values between adults of different status (breeding vs moulting). Breeding adults had higher haematocrit values than moulting adults. The observed differences between age groups are thought to be the result of different oxygen demands due to exercise. The observed differences between adults of different status could reflect the different demands associated with reproduction and moult fasting. (Auth.)

#### B-56740

Reid, K., Croxall, J.P., Edwards, T.M., Hill, H.J., Prince, P.A., **Diet and feeding ecology of the diving petrels *Pelecanoides georgicus* and *P. urinatrix* at South Georgia**, *Polar biology*, Jan. 1997, 17(1), p.17-24, 30 refs.

The diet of the diving petrels *Pelecanoides georgicus* and *P. urinatrix* was studied during 1986 and 1987 by lavaging adults as they returned to feed chicks on Bird I. The diet of both species was dominated by crustaceans, in particular euphausiids, which contributed 47-76% of the biomass of crustaceans in the diet of *P. georgicus*, and copepods, which contributed 71% of the biomass of crustaceans in the diet of *P. urinatrix*. *Calanoides acutus* was the most numerous copepod in the diet of both species; however, *Rhincalanus gigas* was more common in *P. urinatrix* than in *P. georgicus*. The dominant amphipod in the diet of *P. georgicus*, *Primnomacropa*, was absent from the diet of *P. urinatrix*, in which *Themisto gaudichaudii* dominated. Dietary differences were maintained in the period when both species were simultaneously rearing chicks. Knowledge of the prey species and of the diving abilities and foraging habits of diving petrels suggests that at South Georgia *P. urinatrix* feeds closer inshore and dives deeper than *P. georgicus*. (Auth. mod.)

#### B-56741

Fumanti, B., Cavacini, P., Alfinito, S., **Benthic algal mats of some lakes of Inexpressible Island (northern Victoria Land, Antarctica)**, *Polar biology*, Jan. 1997, 17(1), p.25-30, 19 refs.

Benthic algal mats from four lakes located on Inexpressible I. were studied, analyzing their structure and floristic composition. Thirty taxa of algae were identified: 11 Cyanophyta, 15 Bacillariophyta and 4 Chlorophyta. The lake mats contained from 15 (lake C) to 26 species (lake D). The number of diatom frustules in the mats varied from  $771 \times 10^3$  (lake C) to  $9428 \times 10^3$  frustules/g (lake B). In terms of floristic composition and macromorphology, these mats were observed to be very similar to moat mats described from Lake Gondwana (northern Victoria Land) and the Dry Valleys lakes of southern Victoria Land. (Auth.)

#### B-56743

Moline, M.A., Prézelin, B.B., **High-resolution time-series data for 1991/1992 primary production and related parameters at a Palmer LTER coastal site: implications for modeling carbon fixation in the Southern Ocean**, *Polar biology*, Jan. 1997, 17(1), p.39-53, Refs. p.52-53.



The goal was to provide a high-resolution temporal database for modeling primary production in shelf waters adjacent to Palmer Station. Here, the resulting 1991-92 database is used to: determine *in situ* productivity over a range of seasonal to subseasonal time scales; identify time scales of significant variability in marine productivity during the peak growing season; identify environmental, experimental and analytical factors that can significantly impact the accuracy of daily, weekly and seasonal productivity estimates; and integrate the findings with previous studies of antarctic coastal primary production. Seven diel patterns were discerned over the season and used to time-correct instantaneous measurements and derive noontime, daily, monthly and seasonally integrated estimates of production. During the season, a large bloom was responsible for some of the highest daily productivity rates reported for the southern ocean. Significant variation in daily integrated rates occurred generally on time scales less than a week. High frequency sampling and consideration of diel periodicity may be requirements when attempting to discern differences between short time-scale variability and long-term trends in antarctic primary production. (Auth. mod.)

#### B-56744

Laybourn-Parry, J., James, M.R., McKnight, D.M., Priscu, J., Spaulding, S.A., Shiel, R., **Microbial plankton of Lake Fryxell, southern Victoria Land, Antarctica during the summers of 1992 and 1994**, *Polar biology*, Jan. 1997, 17(1), p.54-61, Refs. p.60-61.

Samples collected from Lake Fryxell in Jan. 1992 and 1994 were analyzed for the abundance of bacterioplankton and the diversity and abundance of protistan plankton. At the times of sampling, 14 ciliate species and 10 species of autotrophic flagellate were recorded. The samples contained two species of rotifer (*Philodina* spp.), which formed the first record of planktonic metazoans in the Dry Valley lakes. Bacterial concentrations ranged between 1.0 and  $3.8 \times 10^8/l$  in the upper oxic waters increasing to  $20 \times 10^8/l$  in the anoxic waters. Heterotrophic flagellates decreased in abundance down the oxygenated water column, disappearing completely at 9 m, and ranged between 0.28 and  $7.39 \times 10^5/l$  in abundance. Autotrophic flagellates were much more abundant exhibiting a number of distinct peaks down the water column. The ciliated protozoa were very abundant in relation to flagellate and bacterial numbers, typical of oligotrophic lakes world-wide. The distribution of the protistan plankton showed marked zonation; possible trophic interactions are discussed and comparisons with other continental antarctic lakes made. (Auth. mod.)

#### B-56745

La Mesa, M., Vacchi, M., Castelli, A., Diviacco, G., **Feeding ecology of two nototheniid fishes, *Trematomus hansonii* and *Trematomus loennbergii*, from Terra Nova Bay, Ross Sea**, *Polar biology*, Jan. 1997, 17(1), p.62-68, 25 refs.

A study of feeding ecology in *Trematomus hansonii* Boulenger 1902 and *Trematomus loennbergii* Regan 1913 was carried out from samples collected in the austral summer 1990-91 in Terra Nova Bay. *T. hansonii* was caught between 35 and 566 m, and *T. loennbergii* between 311 and 543 m. Stomach contents analysis shows that *T. loennbergii* relies on a wider range of prey than *T. hansonii*. Fish and decapods are the main food resources of *T. loennbergii*, which feeds also on epifaunal and tube-dwelling polychaetes. *T. hansonii* relies mostly on fish resources that are made up of juvenile stages of fish and eggs. Despite the common area occupied by the two species, the interspecific competition is mostly mitigated due either to taking different prey or to taking different amounts of the same prey. (Auth.)

#### B-56746

Luna-Jorquera, G., Wilson, R.P., Culik, B.M., Aguilar, R., Guerra, C., **Observations on the thermal conductance of Adélie (*Pygoscelis adeliae*) and Humboldt (*Spheniscus humboldti*) penguins**, *Polar biology*, Jan. 1997, 17(1), p.69-73, 31 refs.

Analyses of cooling rates in one Adélie and one Humboldt penguin yielded calculated thermal conductance values of 0.1040 and 0.1672 W(kg °C)<sup>-1</sup>, respectively. The authors review the methods used to calculate penguin surface area, an important component in calculating conductance values, and suggest that, in comparative studies of thermal balance, the use of body mass is a better estimator of body size than surface area. Using previously published data on penguin species, they found a significant model to

predict thermal conductance from body mass according to:  $\log C = \log 0.1083 - 0.474 \log M$ , where C is minimal specific thermal conductance in W(kg °C)<sup>-1</sup> and M is body mass in kilograms. (Auth.)

#### B-56747

Boström, S., ***Chiloplectus masleni* sp. nov. and variability in populations of *Plectus acuminatus* Bastian 1865 (Nematoda: Plectidae) from the nunatak Basen, Vestfjella, Dronning Maud Land, East Antarctica**, *Polar biology*, Jan. 1997, 17(1), p.74-80, 16 refs.

A new species, *Chiloplectus masleni* sp. nov., and 12 populations of *Plectus acuminatus* are described from the nunatak Basen in the Kraul Mountains. *C. masleni* sp. nov. is distinguished from the closely related *C. loricatus* by a broader lip region, longer stoma, the more posterior position of amphids, a pear-shaped basal bulb, more narrow annuli, anterior annuli that are evenly rounded and a larger number of tail setae. New information is provided on internal and external morphology of specimens of *P. acuminatus* from Basen. (Auth.)

#### B-56748

Chown, S.L., **Thermal sensitivity of oxygen uptake of Diptera from sub-Antarctic South Georgia and Marion Island**, *Polar biology*, Jan. 1997, 17(1), p.81-86, Refs. p.85-86.

Oxygen uptake of *Paractora dreuxi* (apterous) from Marion I. was compared to that of *P. trichosterna* (macropterous) and *Antrops truncipennis* (apterous) from South Georgia over the range of temperatures experienced by these insects in their microhabitats. No differences in the slopes of log metabolic rate on temperature were found between the larvae of the two *Paractora* species, but the slope of the regression of log metabolic rate on temperature was steeper in the adults of *P. trichosterna* than in those of *P. dreuxi*. Metabolic cold adaptation was not found in *P. trichosterna* compared to *P. dreuxi*. Some evidence for temperature compensation in *A. truncipennis* was found. The difference in the thermal sensitivity of metabolic rate of the adults of the *Paractora* species is ascribed to differences in their life history strategies. *P. trichosterna* is a winged species in which retention of a thermal sensitivity similar to that of its larvae may facilitate resource location and so enhance fitness. (Auth. mod.)

#### B-56749

Cherel, Y., Guinet, C., Tremblay, Y., **Fish prey of antarctic fur seals *Arctocephalus gazella* at Ile de Croy, Kerguelen**, *Polar biology*, Jan. 1997, 17(1), p.87-90, 21 refs.

The composition of antarctic fur seal prey was assessed through analysis of scats collected in Mar. 1994 on Kerguelen Is. Fish remains predominated in samples, occurring in 95% of droppings. A total of 968 otoliths allowed the identification of 16 fish species. Myctophid fish (12 species) dominated the diet both by number (94% of the otoliths) and by fish reconstituted mass (76%). Three fish species constituted together 87% of the reconstituted mass: the myctophids *Gymnoscopelus nicholsi* (52%) and *G. piabilis* (12%), and the channichthyid *Champscephalus gunnari* (23%). Prey distribution suggests that during late summer seals forage in upper slope waters in the northeast of the Kerguelen Archipelago. (Auth.)

#### B-56750

Barthel, D., **Fish eggs and pentacrinoids in Weddell Sea hexactinellids: further examples for the structuring role of sponges in Antarctic benthic ecosystems**, *Polar biology*, Jan. 1997, 17(1), p.91-94, 18 refs.

During the CS-EASIZ expedition (ANT XII/3) to the eastern Weddell Sea shelf with RF *Polarstern* in Jan.-Mar. 1996, several hundred hexactinellids from trawl catches were inspected for associated fauna. At one station, fish egg masses were found in the suboscular cavities of 18 specimens of hexactinellid sponges belonging to 4 different species of the genus *Rosella*. Egg numbers in intact hexactinellids ranged from about 800 to more than 8,000. At 2 stations, pentacrinoids, the sessile stage of comatulid crinoid development were found attached to the inner dermal membrane of hexactinellids. This is the first time pentacrinoids have been documented from the high Antarctic. The pentacrinoids mostly formed small groups, but single individuals were found as well. Neither fish eggs nor pentacrinoids were observed in or on other structures of animals; these findings



stress the overall importance of sponges, especially hexactinellids, as substrates for developmental stages of other members of the ecosystem. (Auth.)

### B-56757

Boucher, N.P., **Antarctic phytoplankton primary production under enhanced flux of ultraviolet radiation: a bio-optical approach**, Santa Barbara, University of California, 1994, 192p., University Microfilms order No. 95-22775, Ph.D. thesis. Refs. passim.

The link between ozone depletion and increased UV-B irradiance has raised concern and prompted research into the potential impacts of increased UV-B on the ecological balance of Antarctica. One area of prime concern is the possible impact of increased UV-B on the vitality of phytoplankton in the southern ocean. Whereas the spectral increase in radiation associated with the reduction in stratospheric ozone is well known, the effects of the spectral shifts in UV radiation on primary production remain less understood. This dissertation seeks to improve predictive models of phytoplankton productivity in UV-enriched environments. The author combined highly resolved temporal and spatial estimates primary production and UV radiation collected during the spring 1991 west of the Antarctic Peninsula. He shows that ambient UV radiation caused a water column integrated loss of primary production approaching 25%. In comparison to full UVR effects, the short term impact of the 1991 ozone diminution was small but significant: it decreased water column integrated primary production over the region by 2.1%. Long-term ecological consequences of such a diminution remains to be determined. (Auth. mod.)

### B-56762

Page's, F., White, M.G., Rodhouse, P.G., **Abundance of gelatinous carnivores in the nekton community of the Antarctic Polar Frontal Zone in summer 1994**, *Marine ecology progress series*, Oct. 3, 1996, 141(1-3), p.139-147, Refs. p.146-147.

The species composition, abundance, vertical distribution, biovolume and carbon content of gelatinous nekton in the Antarctic Polar Frontal Zone are described from a series of 200 m depth layers between 0 and 1000 m. In total, 13 species of medusa, 6 species of siphonophore, 3 species of ctenophore and 1 species of salp and nemertean were identified. On average gelatinous organisms contributed 69.3% to the biovolume and 30.3% to the carbon content of the samples. Some specific associations and restricted vertical distributions were related to trophic interactions among ostracods, amphipods and cnidarians. Observations made near South Georgia showed that medusae and ctenophores were preyed upon by albatrosses and notothenioid fish respectively. The results support the premise that gelatinous organisms are a major and, at times, are the main component of the oceanic macroplankton/nekton community in the southern ocean. (Auth. mod.)

### B-56763

Smith, R.C., **Implications of increased solar UV-B for aquatic ecosystems**, Biotic feedbacks in the global climatic system: will the warming feed the warming. Edited by G.M. Woodwell and F.T. Mackenzie, New York, Oxford University Press, 1995, p.263-277, Refs. p.273-277.

### DLC QC981.8.G56B47 1995

It is suggested that increased solar ultraviolet radiation induced by the antarctic ozone hole, causes a reduction in primary productivity in the phytoplankton of the antarctic marginal ice zone early each austral spring. The current loss in primary productivity is estimated at 2-4%, and though seemingly small, there is concern that the ozone-induced phytoplankton loss may trigger a positive feedback in atmospheric CO<sub>2</sub> that could exacerbate global warming and have a detrimental impact on the whole ecosystem of the southern ocean.

### B-56766

Wada, E., Mizutani, H., Minagawa, M., **Use of stable isotopes for food web analysis**, *Critical reviews in food science and nutrition*, 1991, 30(4), p.361-371, 17 refs.

### DLC TP368.C46

General aspects in isotope biogeochemistry was summarized with emphasis on  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$  contents in plants and animals in natural ecosystems. In the estuary, the variation of isotope ratios were principally governed by the mixing of land-derived organic matter, marine phytoplankton, and seagrasses. A clear cut linear relationship between animal  $\delta^{15}\text{N}$  and its trophic level was obtained in the antarctic food chain system. Several current efforts to use the stable isotopes for food web analysis were demonstrated for some terrestrial and marine systems as well as human food web. (Auth.)

### B-56770

Nishikawa, J., Nagashima, H., Matsumoto, G.I., Iizuka, H., ***Candida psychrofermentans*, a new yeast species isolated from a water sample of Lake Vanda in South Victoria Land, Antarctica**, Recent progress in antifungal chemotherapy, edited by H. Yamaguchi, G.S. Kobayashi, and H. Takahashi, New York, Marcel Dekker, 1991, p.525-527, 7 refs.

### DLC RM410.R43 1991

Lake Vanda in the Dry Valleys is an interesting meromictic lake. It is covered with thick ice all the year round. In the upper layer down to a depth of 50 m the temperature is always about 7°C and chlorinity is low, while in the deeper layer below 50 m the temperature rises markedly with depth up to 24°C near the bottom (69 m) and the chlorinity greatly increases up to four times that in usual sea water. Dissolved oxygen in the upper layer is saturated, but the bottom layers are anoxic. Some reports have appeared on the distribution of bacteria and fungi, and 12 species of yeasts were found. The authors also reported the characterization and habitats of yeast as well as bacteria isolated from Lake Vanda. They report here the isolation, characterization and nomenclature of a new species of yeast from water samples from the lake.

### B-56779

Abelmann, A., Gowing, M.M., **Horizontal and vertical distribution pattern of living radiolarians along a transect from the southern ocean to the South Atlantic subtropical region**, *Deep-sea research*, Mar. 1996, 43(3), p.361-382, 47 refs.

The horizontal and vertical distribution of living polycystine and phaeodarian radiolarians was investigated at seven locations on a transect from the Antarctic Zone (54°S) to the subtropical region (30°S) in the southeastern South Atlantic during austral autumn. Four or five depth intervals from 0 to 1000 m depth were sampled with opening/closing nets in combination with a hydrographic CTD survey. Highest abundances of radiolarians occurred in the Antarctic Zone south of the Polar Frontal Zone (up to  $1.9 \times 10^4/\text{m}^3$ ), representing the highest abundances yet reported from the southern ocean. There, two species of phaeodarians dominated the assemblages, exceeding polycystine abundances by one to two orders of magnitude. The results combined with results of previous studies indicate that abundances of both groups of radiolarians south of the Polar Front can vary seasonally and geographically over four orders of magnitude. Phaeodarian abundances decreased to the north in the Polar Frontal Zone, while polycystine abundances decreased (to  $<10^2/\text{m}^3$ ) further north in the Subantarctic Zone. Thus, phaeodarian abundances were markedly highest in the cold waters south of the Polar Frontal Zone. Abundances of both groups were low (ca.  $10/\text{m}^3$ ) in the nutrient-poor subtropical region, and polycystine abundances increased in the Namibian upwelling region. Gradients of temperature, silica concentration and nutrients along the transect probably influence the latitudinal abundance pattern of both radiolarian groups. (Auth. mod.)

### B-56780

Boyd, I.L., Croxall, J.P., **Dive durations in pinnipeds and seabirds**, *Canadian journal of zoology*, Sep. 1996, 74(9), p.1696-1705, With French summary. Refs. p.1703-1705.

Many endothermic divers regularly exceed the theoretical limit to the duration of aerobic dives, suggesting that assumptions about either the oxygen storage capacity of tissues or the metabolic rate of divers are wrong. This study examined the frequency distributions of dive durations in five species of endothermic divers from the island of South Georgia, South Atlantic. The theoretical aerobic dive time (TADT), calculated from average field metabolic rate was exceeded regularly by all species except the antarctic fur seal (<6% of dives). In contrast, the gentoo penguin exceeded its TADT in 69% of dives and the elephant seal in 91%. The fre-



quency distributions of dive durations were bimodal, most especially in the penguins, with one mode below the TADT and another above the TADT, suggesting two different physiological strategies for diving. Inter-specific allometric comparisons of dive durations in endothermic divers showed that, in general, relative dive durations in seabirds were greater than in pinnipeds. Dive durations in pinnipeds scaled approximately to field metabolic rate, whereas in seabirds they scaled most closely to flipper surface area, suggesting that they may be partly limited by the rate and degree of conduction of heat to the water. (Auth.)

#### B-56781

Schreer, J.F., Hastings, K.K., Testa, J.W., **Prewaning mortality of Weddell seal pups**, *Canadian journal of zoology*, Sep. 1996, 74(9), p.1775-1778, With French summary. 17 refs.

The authors examined mortality prior to weaning of Weddell seal pups (*Leptonychotes weddellii*), using resighting data collected from 1984 to 1993 on the annual ice of McMurdo Sound. Mortality rates were estimated using counts of dead pups found on the surface and mark-recapture techniques. The standard Jolly-Seber model for open populations fit the recapture data best and corresponded well to the known biology of these animals. Yearly mortality rates estimated by mark-recapture techniques ranged from 6 to 22%, with a mean across years of 13%. These values are twice as high as those previously reported for Weddell seals and those calculated from counts of dead pups in this study. This suggests that there is significant unseen mortality due either to undiscovered fatalities on the ice surface or to significant mortality occurring in the water. (Auth.)

#### B-56782

Acierno, R., et al, **Lipid and fatty acid composition of intestinal mucosa of two antarctic teleosts**, *Comparative biochemistry and physiology*, Dec. 1996, 115A(4), p.303-307, 32 refs.

The fatty acid composition of intestinal mucosa of two antarctic teleosts, *Chionodraco hamatus* and *Trematomus bernacchii*, was investigated in comparison with two temperate water species: *Anguilla anguilla* and *Dicentrarchus labrax*. Higher amounts of unsaturated and monounsaturated fatty acids were present in the antarctic species, while the polyunsaturated fatty acid levels were not significantly different in all fish species. A higher content of phosphatidylethanolamine (a phospholipid rich in unsaturated fatty acids and with a relatively low melting point) and a lower content of sphingomyelin (a phospholipid rich in saturated fatty acids and with relatively high melting point) were observed in *T. bernacchii* in comparison with *A. anguilla*. (Auth.)

#### B-56783

Moreno, J., Barbosa, A., Potti, J., Merino, S., **Effects of hatching date and parental quality on chick growth and creching age in the Chinstrap Penguin (*Pygoscelis antarctica*): a field experiment**, *Auk*, Jan. 1997, 114(1), p.47-54, Refs. p.53-54.

In a Chinstrap penguin rookery on Deception I., the authors experimentally tested two hypotheses to explain the effects of hatching date on chick growth: late breeding pairs are formed by low-quality breeders that are not able to feed their chicks efficiently and are forced to leave them unguarded at younger ages; and late breeding pairs experience a conflict between properly caring for their chicks and commencing the period of premolt reserve storage. By exchanging chicks among nests hatched 6 days apart, the authors separated the effects of quality of adults (as expressed by their breeding dates) from the hatching date of chicks. They measured bill and flipper length and weighed chicks at 17 and 44 days of age, and noted the age at which chicks were left unguarded by parents. Late-hatched chicks attained smaller sizes and masses and were left unguarded at earlier ages than early-hatched chicks. It is concluded that seasonal changes in chick growth and creching age are related to hatching date, not to differences in parental quality. (Auth. mod.)

#### B-56785

Morescalchi, A., Morescalchi, M.A., Odierna, G., Stingo, V., Capriglione, T., **Karyotype and genome size of zoarcids and notothenioids (Teleostei, Perciformes) from the Ross Sea: cytotaxonomic implications**, *Polar biology*, Oct. 1996, 16(8), p.559-564, Refs. p.563-564.

In the absence of fossils, the origin of Notothenioidei, a perciform suborder dominating the fish fauna of the southern ocean, remains conjectural; some morphoecological evidence suggests relationships to zoarcids. To test this point, the authors have compared the karyotype morphology and genome size of 2 species of zoarcids from the Ross Sea to those of one species each of the notothenioid families Artedidraconidae, Bathydraconidae, Channichthyidae and Nototheniidae from the same region. A karyotype of 48, mostly acrocentric, chromosomes, localization of nucleolar organizers on a pair of small dibrachial chromosomes, a genome size of about 3 pg of DNA, characterize both zoarcids; similar features can be found in the karyology of the notothenioids (especially the Nototheniidae). However, all shared characters appear as plesiomorphic in teleost karyology, which does not help in producing new data on the problem of notothenioid relationships. (Auth.)

#### B-56786

Van Franeker, J.A., **Pelagic distribution and numbers of the Antarctic petrel *Thalassoica antarctica* in the Weddell Sea during spring**, *Polar biology*, Oct. 1996, 16(8), p.565-572, Refs. p.571-572.

Seabird censuses during spring 1992 showed few antarctic petrels in the western part of the Weddell Sea, but high numbers east of the South Sandwich Is. The vast majority of the birds occurred in a band of 300 km north to 150 km south of the outer ice edge. Numbers at sea fluctuated in agreement with synchronized colony attendance patterns in the pre-breeding phase and peaked shortly before egg-laying when colonies are completely deserted. In this period, densities of antarctic petrels in the marginal ice zone suggest that at least 2.7 million individuals occur in the Weddell Sea. It is likely that similar numbers occur immediately east of the study area. The distribution of the petrels matches the location, but not the size, of known breeding colonies in Queen Maud and Coats lands, which suggests that important colonies in this area remain to be discovered. The observations imply that antarctic petrels in the Weddell Sea commute over ice a distance of at least 2,000 km for a single pre-breeding visit to the colonies. (Auth. mod.)

#### B-56787

Razouls, S., Koubbi, P., Mayzaud, P., **Spatio-temporal distribution of mesozooplankton in a sub-Antarctic coastal basin of the Kerguelen Archipelago (southern Indian Ocean)**, *Polar biology*, Oct. 1996, 16(8), p.581-587, 28 refs.

During 17 surveys carried out in the Morhiban Bay at Kerguelen Is. from Jan. to Dec. 1990, temperature and salinity were measured at 4 or 5 standard depths. Chlorophyll, carbon and nitrogen contents of surface water particulate matter were determined along with mesozooplanktonic biomass and abundance of copepods. The dominant species (90%) of mesozooplankton was *Drepanopus pectinatus*; 2 other taxa, *Oithona* spp. and *Calanus simillimus*, accounted for 8.6 and 0.4% respectively. A Multiple Correspondence Analysis was used to determine the influence of abiotic (temperature and salinity) and biotic factors (potential food supply) on the spatio-temporal distribution of copepods and, more specifically, on that of the growth stages of *D. pectinatus*. No specific hydrological features were found. The distribution of copepods was fairly homogeneous in the whole bay while the quantitative changes were influenced by the seasonal rhythm. Only a slight trend of increasing values for the biotic or abiotic parameters and the neritic *D. pectinatus* was observed from the central to the inner back area of the bay. (Auth. mod.)

#### B-56788

Schulz, K., ***Mospicalanus schielae*, a new genus and species of calanoid copepod (Crustacea: Spinocalanidae) from deep Antarctic water**, *Polar biology*, Oct. 1996, 16(8), p.595-600, 12 refs.

A new genus and species, *Mospicalanus schielae*, collected at bathypelagic depth in the antarctic ocean, is described from female specimens and a stage V male. The new species is placed in the Spinocalanidae on account of the absence of fifth legs and leg 1 characteristics. It appears to be closely related to *Mimocalanus* Farran, 1908, sharing apomorphic characters such as the lack of a rostrum, reductions of setal armament on the mouthparts, and absence of an outer spine on the first exopod segment of leg 1. *M. schielae* can be distinguished from other spinocalanid genera by the setation of the antennary exopod, the maxillule, and the paecoxal endite of maxilla. Diagnostic characters of Spinocalanidae and Bathypnon-



tiidae are also discussed in order to clarify affiliation of genera tentatively assigned to the latter family. An updated key is given for the spinocalanid genera. (Auth.)

#### B-56789

Pedros-Alió, C., Calderón-Paz, J.I., Guixa, N., Navarrete, A., Vaqué, D., **Microbial plankton across Drake Passage**, *Polar biology*, Oct. 1996, 16(8), p.613-622, Refs. p.621-622.

The authors determined biomass and activity of microbial plankton across the Polar Front (PF) in the Drake Passage during Jan. 1994. Temperature was around 0°C south, and between 3 and 5°C north, of the PF. Both biomass and activities of microorganisms were significantly lower in the antarctic waters south of the PF than north of it. Bacteria varied between  $10^{14}$  and  $4 \times 10^{13}$  cells/m<sup>2</sup>. The abundance of heterotrophic nanoflagellates was extremely low throughout the Drake Passage (around  $3 \times 10^{10}$  cells/m<sup>2</sup>). Bacterial doubling times were long (mean of 25 days). Bacterivory was estimated from the abundance of predators and prey and from temperature. The grazing impact on bacterioplankton biomass was insignificant (less than 0.05% per day) and low on bacterial heterotrophic production (15% per day). Neither biomass nor the activities of microorganisms were found to increase at the PF. The microbial food web was uncoupled and the bacteria did not seem to be controlled by predation. (Auth. mod.)

#### B-56790

Grossmann, S., Lochte, K., Scharek, R., **Algal and bacterial processes in platelet ice during late austral summer**, *Polar biology*, Oct. 1996, 16(8), p.623-633, Refs. p.632-633.

The biota inhabiting layers of platelet ice were investigated in the Weddell Sea during late austral summer. Due to meltwater release, the salinity of the interstitial water between platelets was reduced. Algae and bacteria accumulated within this ice environment attaining concentrations of up to 500 µg in total pigments (chlorophyll *a* plus phaeopigments) and 2 mg in bacterial biomass per liter. Pennate diatoms of the genus *Fragilariopsis* were most common in the platelet layer, while ice-free water was dominated by autotrophic nanoflagellates. Protozoa contributed only 5% or less to the total protistan (microalgae plus protozoa) cell concentration in the ice, compared to about 10% in open water, thus suggesting a low grazing pressure within the platelet habitat. The bulk of bacterial biomass occurred within the dense assemblages of pennate diatoms that grew attached to the ice platelets. Algal and bacterial concentrations in the interstitial water between platelets were much lower. Measurements of bacterial growth showed that substantial heterotrophic potential can be established within assemblages inhabiting late summer platelet ice. (Auth. mod.)

#### B-56829

Perissinotto, R., Pakhomov, E.A., **Feeding association of the copepod *Rhinacalanus gigas* with the tunicate salp *Salpa thompsoni* in the southern ocean**, *Marine biology*, Feb. 1997, 127(3), p.479-483, Refs. p.482-483.

During a repeat grid survey and drogue study carried out in the Lazarev Sea in the summer of 1994 to 1995, a sudden collapse of a rich population of the tunicate *Salpa thompsoni* was observed at the onset of a phytoplankton bloom. This may have been related to the inability of salps to regulate their filtration rate and avoid clogging of their filtering apparatus at particle concentrations  $\geq 1$  mg (chlorophyll *a*)/m<sup>3</sup>. It was at this stage that large numbers of salp individuals had their branchial cavities invaded by the copepod *Rhinacalanus gigas*. Incubations, to compare the feeding rates of *R. gigas* in the presence and absence of salps, showed that copepods are able to utilize the high concentrations of microplankton accumulated in the food strand of the salp, thus enhancing their grazing efficiency. This is likely to represent a typical form of opportunistic parasitism. However, the timing of the invasion, and the observation that most salps could survive prolonged exposure to *R. gigas* invasion, suggest that the association may also constitute a novel type of symbiosis. *S. thompsoni* could potentially benefit from *R. gigas* cleaning its filtering apparatus when clogging due to high particle concentrations occurs. (Auth.)

#### B-56830

Lesser, M.P., Neale, P.J., Cullen, J.J., **Acclimation of Antarctic phytoplankton to ultraviolet radiation: ultraviolet-absorbing**

**compounds and carbon fixation**, *Molecular marine biology and biotechnology*, Dec. 1996, 5(4), p.314-325, Refs. p.323-325.

The sensitivity of antarctic phytoplankton to ultraviolet-B, ultraviolet-A, and photosynthetically available radiation has been demonstrated through measurement of spectrally detailed biological weighting functions (BWFs) for the inhibition of photosynthesis. Assemblages growing in McMurdo Sound during the 1991 austral spring, simulating conditions in the marginal ice zone, had similar BWFs whether or not they were grown in ultraviolet-opaque (UVO) or ultraviolet-transparent (UVT) enclosures. Predictions based on these BWFs for ultraviolet (UV) sensitivity are now compared with in vivo photosynthetic response, the effects of UV radiation on cellular targets, and the protection provided by UV-absorbing compounds. Differences between midday samples from UVO and UVT enclosures in chlorophyll-specific photosynthetic rates, and in rates measured during reciprocal transfers of UVO- and UVT-acclimated phytoplankton were in good agreement with BWF predictions. Inhibition by UV radiation occurred despite the accumulation of UV-absorbing compounds in both assemblages and a 35% higher concentration of these compounds in the UVT cultures. (Auth. mod.)

#### B-56831

Richards, R., **"Upland seal" of the Antipodes and Macquarie Islands: a historian's perspective**, *Royal Society of New Zealand. Journal*, Sep. 1994, 24(3), p.289-295, Refs. p.294-295.

Several zoologists have used historical material to postulate that a distinct species of seal, identified only as the "upland seal", once inhabited the Antipodes and Macquarie islands, but is now extinct. On closer examination that conclusion seems unsustainable. However, when taken with the recent conclusions of Taylor (1992), the historical evidence may help provide an explanation of why the total seal stocks on the Antipodes, and elsewhere in the wider New Zealand region, are taking at least two centuries, or more, to recover their former numbers. (Auth.)

#### B-56849

Chastel, O., Weimerskirch, H., Jouventin, P., **Body condition and seabird reproductive performance: a study of three petrel species**, *Ecology*, Oct. 1995, 76(7), p.2240-2246, Refs. p.2245-2246.

The study was conducted on Kerguelen Is., from 1987 to 1994, on the Blue Petrel, the Thin-billed Prion and the Common Diving Petrel. Breeding success was highly variable in the 3 species, but the proportion of non-breeding experienced breeders varied significantly only in the Blue Petrel. Body condition showed considerable year-to-year variation in all 3 species suggesting substantial fluctuation in the availability of prey early in the breeding season. Reproductive success was significantly influenced by early body condition in the Blue Petrel but not in the other 2 species. In the long-lived Blue Petrel, depletion of body condition early in the breeding season resulted in a high proportion of nonbreeders and massive egg desertion. The shorter lived Thin-billed Prion and Common Diving Petrel seemed to respond by maintaining their reproductive output during poor years, probably investing more in the reproductive episode. Such contrasted patterns are analyzed in the light of reproductive effort and optimal clutch size theory. (Auth. mod.)

#### B-56850

Orgeira, J.L., **Seabird from South Georgia, fall 1993** [Observaciones de aves marinas de las islas Georgias del Sur, otoño de 1993], *Revista brasileira de biologia*, Aug. 1996, 56(3), p.491-496, In Spanish with English and Portuguese summaries. 13 refs.

A census of seabirds in 3 transects east of South Georgia was carried out June 2-4, 1993; 1263 individuals and 19 species were recorded in 59 observation periods of 10 min. each. *Pelecanoides urinatrix* was the dominant species, followed by *Halobaena caerulea* and *Aptenodytes patagonica*. The highest abundance occurred between 8:00 and 9:40 AM. Abundance and diversity rates decreased as the distance from land increased. From 8:40 to 9:20 AM, the species began flying NE, returning to the island at about 9:40 AM to 1:20 PM. They often gathered in mixed flocks, possibly as a strategy of food localization. Although the plankton biomass is widespread in the region, there seemed to be large concentrations of krill on the east side of the island at the beginning of June. (Auth. mod.)



**B-56858**

Convey, P., Smith, R.I.L., **Terrestrial arthropod fauna and its habitats in northern Marguerite Bay and Alexander Island, maritime Antarctic**, *Antarctic science*, Mar. 1997, 9(1), p.12-26, Refs. p.25-26.

Field surveys of free-living terrestrial microarthropods were made during the 1994-95 summer at 4 sites in northern Marguerite Bay and 3 on southern Alexander I. Detailed site descriptions are presented. Twenty species (4 Collembola, 16 Acari) were recorded from the Marguerite Bay sites. Species diversity at these sites is as great as at any known site elsewhere in the maritime Antarctic, although the total area of terrestrial habitat available is small. Individual species and total population densities are also similar to, if not greater than, published studies from the South Shetland and South Orkney Islands. None of the species is new to the maritime Antarctic, although the distributions of several are extended southwards. Only 9 species were found on Alexander I. This still represents a high species diversity for such a high latitude site. The Alexander fauna is clearly related to that of the maritime Antarctic, as all except one species occur at more northerly sites elsewhere on the Antarctic Peninsula, and none in the continental Antarctic. One species, *Friesia topo* (Collembola), is known only from Alexander I. (Auth. mod.)

**B-56859**

Eastman, J.T., DeVries, A.L., **Biology and phenotypic plasticity of the Antarctic nototheniid fish *Trematomus newnesi* in McMurdo Sound**, *Antarctic science*, Mar. 1997, 9(1), p.27-35, Refs. p.34-35.

*Trematomus newnesi* inhabited inshore (<20 m) subzero waters in McMurdo Sound where it fed in the water column on *Euphausia crystallophias* and fishes. This sample included the largest reported specimens of this species. The length-weight relationship was  $\text{Weight} = 3.17 \times 10^{-6} (\text{Standard Length})^{3.34}$ ,  $n=67$ ,  $r^2=0.95$ . The population was phenotypically plastic, with two distinct morphs easily separated by visual inspection—the typical morph and a large mouth/broad headed morph comprising 28% of the sample. The large mouth morph had a wider and blunter head, longer upper jaw, wider gape, more heavily ossified jaws and darker coloration. To document this morphology, four views of the head are illustrated. Inference from morphology and measurements suggested that the large mouth morph was more benthic than the typical semipelagic morph. Museum specimens from Cape Adare confirmed the presence of the large mouth morph 700 km north of McMurdo Sound. (Auth. mod.)

**B-56860**

Huiskes, A.H.L., Gremmen, N.J.M., Francke, J.W., **Morphological effects on the water balance of Antarctic foliose and fruticose lichens**, *Antarctic science*, Mar. 1997, 9(1), p.36-42, Refs. p.41-42.

Uptake and loss of water by 6 lichen species from the Argentine Is. were studied in their natural habitat and in laboratory studies. Under field conditions, during a period of rain, uptake of moisture ranged from 15% d w/h for *Usnea antarctica* to almost 90% for *Mastodia tessellata*. Loss rates after the rain ceased were lower than the uptake rates and ranged from 8.5% d w/h in *Umbilicaria decussata* to 38.8% in *M. tessellata*. A comparison of thalli of *M. tessellata* from the shoreline with thalli collected further inland showed significant differences in maximum water content and in rates of water loss and uptake between thalli from these sites, which could be ascribed to the presence of salt in the thalli of *M. tessellata* from the shore. Thallus samples of *U. antarctica* collected from an exposed site showed lower uptake rates and higher loss rates of water than samples collected from a more sheltered site. The results of the laboratory experiments agree with those from the field study. However, local differences in microclimatic or other environmental factors can be responsible for significant differences in the water regime of thalli of the same species, a result which can only be obtained from field studies. (Auth. mod.)

**B-56863**

Feldmann, R.M., Quilty, P.G., **First Pliocene decapod crustacean (Malacostraca: Palinuridae) from the Antarctic**, *Antarctic science*, Mar. 1997, 9(1), p.56-60, 14 refs.

A single specimen of palinurid lobster, possibly *Linuparus*, from Pliocene rocks in the Vestfold Hills documents the only post-Miocene occurrence of decapod crustaceans in the Antarctic. The badly crushed,

partial remains, probably an exuvia, are encrusted with the serpulid worm, *Spirorbis* Daudin. The specimen's remains are described and illustrated. (Auth. mod.)

**B-56868**

Finegold, L., **Molecular and biophysical aspects of adaptation of life to temperatures below the freezing point**, *Advances in space research*, Dec. 1996, 18(12), p.(12)87-(12)95, Life Sciences: Space and Mars Recent Results. Proceedings of the F3.1, F3.4, F2.4, and F3.8 Symposia of COSPAR Scientific Commission F which were held during the Thirtieth COSPAR Scientific Assembly, Hamburg, Germany, 11-12 July 1994. Edited by A. Brack, G. Horneck, E.I. Friedmann, M.A. Meyer, G. Reitz, and A. Banin. 54 refs.

This review examines adaptation of life to temperatures below -2°C, from a biophysical point of view and relative to the properties of water. Different metabolic processes have different lowest temperatures. The lowest established temperature for photosynthesis and growth seems to be about -17°C. The review discusses membrane lipids from antarctic microbial systems, and the limits to longevity of life in the cold, with coverage of permafrost microbial systems. It is directed towards readers of many backgrounds and supplements an earlier survey. (Auth. mod.)

**B-56869**

Kappen, L., Schroeter, B., Scheidegger, C., Sommerkorn, M., Hestmark, G., **Cold resistance and metabolic activity of lichens below 0°C**, *Advances in space research*, Dec. 1996, 18(12), p.(12)119-(12)128, Life Sciences: Space and Mars Recent Results. Proceedings of the F3.1, F3.4, F2.4, and F3.8 Symposia of COSPAR Scientific Commission F which were held during the Thirtieth COSPAR Scientific Assembly, Hamburg, Germany, 11-12 July 1994. Edited by A. Brack, G. Horneck, E.I. Friedmann, M.A. Meyer, G. Reitz, and A. Banin. 32 refs.

Laboratory measurements show that lichens are extremely tolerant of freezing stress and of low-temperature exposure. Metabolic activity recovered quickly after severe and extended cold treatment. Experimental results demonstrate also that CO<sub>2</sub> exchange is already active at around -20°C. The psychrophilic character of polar lichen species is demonstrated by optimum temperatures for net photosynthesis between 0 and 15°C. *In situ* measurements show that lichens begin photosynthesizing below 0°C if the dry thalli receive fresh snow. The lowest temperature measured in active lichens was -17°C at a continental antarctic site. The fine structure and the hydration state of photobiont and mycobiont cells were studied by low-temperature scanning electron microscopy (LTSEM) of frozen hydrated specimens. Water potentials of the frozen system are in the range of or even higher than those allowing dry lichens to start photosynthesis by water vapor uptake at +10°C. The great success of lichens in polar and high alpine regions gives evidence of their physiological adaptation to low temperatures. In general lichens are able to persist through glacial periods but extended snow cover and glaciation are limiting factors. (Auth.)

**B-56870**

Becker, K., Rahmann, H., **Polysialylation of brain gangliosides as a possible molecular mechanism for survival of antarctic ice fish below the freezing point**, *Advances in space research*, Dec. 1996, 18(12), p.(12)129-(12)133, Life Sciences: Space and Mars Recent Results. Proceedings of the F3.1, F3.4, F2.4, and F3.8 Symposia of COSPAR Scientific Commission F which were held during the Thirtieth COSPAR Scientific Assembly, Hamburg, Germany, 11-12 July 1994. Edited by A. Brack, G. Horneck, E.I. Friedmann, M.A. Meyer, G. Reitz, and A. Banin. 12 refs.

In order to determine possible adaptation strategies of vertebrates to extreme low-temperature environments, the concentration and composition of gangliosides from the brains of eight species of antarctic Notothenioid "ice" fishes were compared with those of warm-adapted species and those of fishes from habitats of moderate temperature. The concentration of whole-brain gangliosides in the ice fishes was comparable with that in moderate-temperature species (between 3.36 and 4.31 mg NeuAc/g protein). The composition of brain gangliosides differed, however. In particular, the relative concentrations of polysialogangliosides (= polarity) and alkali-labile gangliosides was higher in all antarctic species investigated



than in warm-adapted fish species. This difference is considered a suitable mechanism for keeping neuronal membranes functional even below the freezing point. This interpretation is supported by additional physico-chemical results with artificial monolayer membranes, which give evidence for a high thermosensitivity of ganglioside complexes in connection with calcium. (Auth.)

#### B-56872

Culik, B.M., et al, **Diving energetics in king penguins (*Aptenodytes Patagonicus*)**, *Journal of experimental biology*, April 1996, 199(4), p.973-983, 39 refs.

Dive duration in wild king penguins and the energetic cost of swimming in a 30 m long swim channel were determined at Possession, I., Crozet Archipelago, using external data loggers and respirometry, respectively. Calibrated electronic data loggers equipped with a pressure sensor were used to determine dive durations: 95% of dives were less than 6 min long and 66% of dives were less than 4 min long. Dive patterns show that king penguins may intersperse long dive durations (4-6.3 min) with short ones (1.5-3 min) and make surface pauses of variable duration between them (0.5-3.5 min), or dive regularly (for up to 5 h) with long dive durations (5 min) and constant interdiving surface intervals (1.5 min). The latter indicates that the aerobic dive limits (ADL) of this species could be higher and oxygen consumption lower than previously reported. Assuming that king penguins dive within their aerobic limit, different approaches to the analysis of the data obtained in the swim channel are discussed to derive the ADL. (Auth. mod.)

#### B-56873

Buchholz, F., Watkins, J.L., Priddle, J., Morris, D.J., Ricketts, C., **Moult in relation to some aspects of reproduction and growth in swarms of antarctic krill, *Euphausia superba***, *Marine biology*, Dec. 1996, 127(2), p.201-208, 38 refs.

In a 14-d period 38 swarms of antarctic krill, were sampled in an area southwest of Elephant I. Moulting stage, maturity stage, and size of ca. 100 krill from each swarm were measured. Each of the characteristics varied greatly between swarms. Moulting krill were found in most swarms, but in one swarm all of the krill were just about to moult. Ways in which moulting may act as a possible sorting mechanism are discussed. Data for all the analyzed krill were used to investigate the interdependence of moulting rate, sexual maturation and growth. While all immature krill moulted at approximately the same rate in the study, there were significant differences in the moulting rates of mature male and female krill. Gravid female krill continued to moult, although less frequently than mature males. As a consequence males had to attach spermatophores to females after each moult. It is likely that variation in moulting rate of females and males was related to the energy expenditure required for ovary development in females and spermatophore production and searching behavior in males. Spawning and moulting were only partly coupled in gravid females. Spawning appeared to take place predominantly during Moulting Stage D<sub>2</sub>. There was no evidence of intermoult growth by intersegmental dilation. (Auth. mod.)

#### B-56877

Cheng, C.H.C., **Genomic basis for antifreeze glycopeptide heterogeneity and abundance in Antarctic fish**, Gene expression and manipulation in aquatic organisms. Edited by S.J. Ennion and G. Goldspink. Society for Experimental Biology. Seminar series 58, Cambridge, Cambridge University Press, 1996, p.1-20, Refs. p.16-20.

DLC QL638.99.G45 1996

Aside from their unique function, antifreeze proteins as a single functional class of proteins are typified by two distinctive characteristics, structural diversity and molecular heterogeneity, and their high level of abundance in the fish especially in antarctic fishes which experience persistent cold temperature extremes. The complexity of the molecular heterogeneity and the great abundance of antifreeze protein are illustrated in this chapter for the antarctic notothenioid fishes, and the interesting gene structures and organization that give rise to these two characteristics are discussed.

#### B-56878

Goldspink, G., **Temperature adaptation: selective expression of myosin heavy chain genes and muscle function in carp**, Gene

expression and manipulation in aquatic organisms. Edited by S.J. Ennion and G. Goldspink. Society for Experimental Biology. Seminar series 58, Cambridge, Cambridge University Press, 1996, p.75-91, Refs. p.88-91.

DLC QL638.99.G45 1996

Fish provide good examples to illustrate the point that different isozymes (protein isoforms) have evolved to operate at different temperatures, as different species occupy well-defined thermal niches ranging from -1.5°C at the poles to 45°C for some species that live in geothermal springs. Most species of fish are restricted to a narrow thermal range, e.g. antarctic fish are restricted to -1.5 to +4°C. In order to study the activity and thermal stability of the contractile mechanism of muscles from antarctic fish and fish from a range of environmental temperatures, the authors isolated myofibrils from the muscles of these fish and measured the specific ATPase and the rate at which the ATPase activity was lost by heat denaturation. The specific myofibrillar ATPase was much higher in the muscles of antarctic fish than tropical or temperate water fish at low temperature.

#### B-56879

Ansell, A.D., Rhodes, M.C., **Unusual capabilities for surface movement in a normally deep-burrowed Antarctic bivalve**, *Journal of molluscan studies*, Feb. 1997, 63(1), p.109-111, 9 refs.

*Laternula elliptica* (Anomalodesmata, Laternulidae) is among the most abundant and ubiquitous infaunal bivalves in shallow waters around the antarctic continent, reaching population densities of up to 86/m<sup>2</sup> in a variety of soft sediment types. Adult individuals of up to 90 mm shell length may be 12-13 years old. *L. elliptica* retain throughout their life the ability to re-burrow if uncovered from the sediment, and also exhibit a hitherto undescribed mode of movement on the sediment surface, following dislodgement, powered by contractions of the muscles of the siphons and mantle. The observations reported here were made on a group of 14 *L. elliptica* (shell lengths ranging 44.6-78.0 mm) collected near the British Antarctic Survey base at Signy I. during the austral summer of 1994-95. (Auth. mod.)

#### B-56894

Smith, W.O., Jr., Gordon, L.I., **Hyperproductivity of the Ross Sea (Antarctica) polynya during austral spring**, *Geophysical research letters*, Feb. 1, 1997, 24(3), p.233-236, 17 refs.

The authors conducted a cruise to the Ross Sea polynya in Nov.-Dec., 1994 to measure the contribution of phytoplankton during the austral spring to the annual productivity of the region and found markedly enhanced levels of phytoplankton biomass. Chlorophyll concentrations were greater than 3 µg/l in mid-Nov. Particulate matter concentrations increased through time, and by early Dec. chlorophyll and particulate carbon concentrations exceeded 10 µg/l and 53 µmol/l, respectively. Primary productivity also increased through time. Productivity based on nitrate disappearance averaged 1.52 g C/m<sup>2</sup>/d, suggesting that the bloom's new production was also substantial. The Ross Sea polynya is the most southerly location in the Antarctic where phytoplankton growth is initiated this early and which supports such high standing stocks by early Dec. Inclusion of this production in a carbon budget for the region suggests that this area supports an annual production of 200 g C/m<sup>2</sup>, the largest of any region in the southern ocean, and confirms its hyperproductive nature. (Auth. mod.)

#### B-56900

Riaux-Gobin, C., **Check-list of the *Cocconeis* species (Bacillariophyceae) in antarctic and subantarctic areas, with special focus on Kerguelen Islands**, *Cryptogamie, algologie*, May 1994, 15(2), p.135-146, With French summary. Refs. p.138-140.

The high diversity and abundance of the genus *Cocconeis* in subtidal marine sediments in the Kerguelen area, especially under the *Macrocystis* canopy, prompted a bibliographic review concerning this genus in antarctic and subantarctic areas. Major oceanographic expeditions provided the description of numerous new species and varieties, but also many dubious taxa: of the 38 new taxa mentioned, only 23 are recognized as valid by VanLandingham (1968). A few species, or their synonyms, are regularly mentioned by authors and may characterize these southern polar habitats, the others seem to be rare or geographically restricted. Freshwater species are also listed. (Auth.)



**B-56921**

Pugh, P.J.A., **Using artificial substrata to monitor how crypto-faunal Acari colonize littoral algae on sub-Antarctic South Georgia**, *Acarologia*, Oct. 1996, 37(3), p.189-200, With French summary. Refs. p.198-200.

The colonization of littoral macroalgae by meiofaunal Acari on South Georgia was studied using spun-nylon pan scourers as artificial substrata. A total of 12 species of littoral Acari, including 2 Rhodacaridae, 4 Halacaridae, 3 Podacaridae and 3 Hyadesiidae, were collected from the scourers. *Rhombognathus auster*, *R. plumifer* (Halacaridae), *Halozetes littoralis*, *H. marinus* (Podacaridae) and *Hyadesia subantarctica* (Hyadesiidae) rapidly establish their dominance in spring and remain ascendant throughout the summer. Predation and competition have minimal impact on the mite populations compared with abiotic (climatic) influences. Low winter temperatures exert an indirect pressure by killing most of the algal substrata, while storms have a more direct effect by removing both mites and algae from the shore. Surviving mites over-winter in the shelter afforded by crevices and among the basal portions of enduring algae. (Auth.)

**B-56925**

Sun, S., Wang, R., **Study on the relationship between the diameter of the compound eye and the growth of the antarctic krill**, *Antarctic research*, Dec. 1996, 7(2), p.87-93, 12 refs. For Chinese original see 24B-55322.

Correlation between the body length and the diameter of the compound eye of the antarctic krill *Euphausia superba* was examined. Samples collected in the late summer show that there is an apparent exponential relationship between eye diameter and the body length. From the laboratory population, it seems that when the krill shrink, the diameter of the compound eye does not decrease. It is more reliable to use the eye diameter as krill growth index than body length. The ratio of the body length to the diameter of the compound eye offers another method for detecting the effect of shrinking in natural populations of krill. (Auth.)

**B-56931**

He, J.F., Chen, B., **Vertical distribution and seasonal variation in ice algae biomass in coastal sea ice off Zhongshan Station, East Antarctica**, *Antarctic research*, Dec. 1996, 7(2), p.150-163, Refs. p.161-163. For Chinese original see 50-3642 or 24B-54582.

Algal communities in coastal sea ice off Zhongshan Station were monitored from Apr. to Dec. 1992. The maximum thickness of ice cover was 1.74 m (Nov.-Dec.). Brown layers occurred in 2-5 cm of the ice bottom in late Apr. and Nov., with chlorophyll *a* peak values of 360.7 and 2810 mg/m<sup>3</sup>, respectively. The integrated chlorophyll *a* values ranged from 1.17 to 59.7 mg/m<sup>2</sup>, with the peak occurring in Nov. when ice algae bloomed, and the values never exceeded 6 mg/m<sup>2</sup> before mid-Oct. The highest value occurred in Apr. Most of the biomass was concentrated in the bottom ice. The dominant diatoms were composed of *Nitzschia lecontei*, *N. barkleyi*, and *N. cylindrus* in the fall, and *Amphiprora kjellmannii*, *Berkeleya rutilans*, and *N. lecontei* in the spring. (Auth. mod.)

**B-56933**

Rakusa-Suszczewski, S., ed, Donachie, S.P., ed, **Microbiology of antarctic marine environments and krill intestine, its decomposition and digestive enzymes**, Warsaw, Polish Academy of Sciences. Department of Antarctic Biology, 1995, 254p., Refs. passim. For individual papers see B-56934 through B-56936.

The 3 papers presented in this book reflect an interest in the role of krill (*Euphausia superba* Dana) in the antarctic marine ecosystem. Krill, with its capacity to swarm, forms spatially and temporally variable trophic systems that enhance biodiversity within the antarctic ecosystem. Swarms attaining great biomass modify the aquatic environment both chemically and biologically. The papers give quantitative descriptions of both total and saprophytic bacterial numbers in a range of antarctic marine habitats, including their annual variations in the coastal zone. In addition, saprophytic bacteria isolated from various parts of the krill digestive tract and fecal pellets are compared with those from seawater and sea-ice in terms of their capacity to utilize various organic substrates, and also on the basis of their respective constitutive enzyme activities. Krill decomposi-

tion under natural conditions is also addressed: in shallow waters krill death seems to be a source of organic matter for benthic communities. Peptidase and glycosidase enzymes isolated from krill are also described.

**B-56934**

Zdanowski, M.K., **Characteristics of bacteria in selected antarctic marine habitats**, *Microbiology of antarctic marine environments and krill intestine, its decomposition and digestive enzymes*. Edited by S. Rakusa-Suszczewski and S.P. Donachie, Warsaw, Polish Academy of Sciences. Department of Antarctic Biology, 1995, p.7-100, Refs. p.87-100.

Results presented here are based on work conducted during 6 antarctic expeditions: 4 marine (summer/autumn 1981; summer/autumn 1984; spring 1986, summer 1988-89), and 2 at Arctowski Station (1978-80, and 1983-84). In 1983-84, investigations of the distribution of bacteria in Admiralty Bay that commenced in 1978-1980 were continued. Apart from morphological descriptions of the bacterioplankton, including the saprophytes, particular attention is paid to the latter in terms of their capacity to utilize protein and carbohydrates as carbon sources. Characteristics are described based on microscopic examination, experiments considering the effects of temperature on bacterial growth, and on the API system. Biochemical and physiological properties of bacteria from selected antarctic marine habitats are discussed. The work is a synthesis of the author's published and unpublished data; it compares and contrasts his findings with those in the literature.

**B-56935**

Donachie, S.P., **Ecophysiological description of marine bacteria from Admiralty Bay (Antarctica), and the digestive tracts of selected Euphausiidae**, *Microbiology of antarctic marine environments and krill intestine, its decomposition and digestive enzymes*. Edited by S. Rakusa-Suszczewski and S.P. Donachie, Warsaw, Polish Academy of Sciences. Department of Antarctic Biology, 1995, p.101-196, Refs. p.178-185.

To determine whether there are saprophytic bacteria that can be considered as common, or even specific, to one or more selected antarctic habitats, such as the water column and sea-ice of Admiralty Bay, *Euphausia superba* stomach and feces, *Thysanoessa macrura* stomach, and *Notothenia neglecta* pyloric caecum were compared on physiological and morphological bases. A range of statistical methods were applied to the responses to provide an insight into the potential interactions between bacteria and euphausiids. Results are discussed in detail and tabulated data are presented.

**B-56936**

Turkiewicz, M., **Characterisation of some digestive enzymes from *Euphausia superba* Dana**, *Microbiology of antarctic marine environments and krill intestine, its decomposition and digestive enzymes*. Edited by S. Rakusa-Suszczewski and S.P. Donachie, Warsaw, Polish Academy of Sciences. Department of Antarctic Biology, 1995, p.197-254, Refs. p.245-253.

The focus of this chapter is mainly on the system of digestive enzymes produced by the antarctic krill. The following enzymes from *Euphausia superba* are characterized: one of two detected endo- $\beta$ -1,3-glucanases (EC 3.2.1.39); a unique serine proteinase with collagenolytic activity as its most significant feature; two endo- $\beta$ -1,4-xylanases; the CM-cellulase; and an  $\alpha$ -amylase that digests raw starch, also at low temperature (4°C). It is suggested that the contribution of the laminarinase, serine collagenase, and the xylanases to the *E. superba* digestive enzyme pool proves that this animal is capable of utilizing material of both plant and animal origins, as well as detritus.

**B-56953**

Chen, X.Z., Xu, Z.Y., Chen, G.Z., **Distribution and standing crops of antarctic krill in the Prydz Bay region**, *Antarctic Research (Chinese edition)*, Sep. 1996, 8(3), p.46-53, In Chinese with English summary. 16 refs.

Based on surveys carried out in the Prydz Bay region during the summers of 1991-1993, krill standing crops and horizontal and vertical distribution were calculated using the integral system of relative quantitative assessment of the images recorded by echo sounders. Results show the



following: the densest area of krill aggregation was found along 63°-67°S, 68°E, off Prydz Bay. The 1991-1992 data show that most of krill aggregations occurred in the depths of 20 and 60 m, representing 80.88% of the total image area. The 1992-1993 data show that the main distribution of krill aggregation occurred between 10 and 50 m, accounting for 87.18% of the total image area. Also based on images recorded,  $1.699 \times 10^6$  tons of standing crops and  $22.99 \text{ t/km}^2$  of density distribution were estimated in 1991-1992;  $4.043 \times 10^6$  tons of standing crops, with an average distribution density of  $32.15 \text{ t/km}^2$ , were recorded in 1992-1993.

#### B-56955

Li, X.D., Liu, J.X., Hu, D., Chen, F.D., **Taxonomic character and distribution of *Deschampsia antarctica* in the Fildes Peninsula, Antarctica**, *Antarctic Research (Chinese edition)*, Sep. 1996, 8(3), p.61-64, In Chinese with English summary. 7 refs.

*Deschampsia antarctica* is a common species of seed plant occurring on the Fildes Peninsula. As one of the few vascular plants, it has an important role in the antarctic terrestrial ecosystem. The taxonomic character and distribution of *D. antarctica* are described. The environmental influences on the development of the plant are discussed. (Auth.)

#### B-56968

Coria, N.R., Fontana, R., Vivequin, S., Spairani, H., **Adélie penguin diet during the breeding season at Stranger Point** [Dieta del pingüino Adelia *Pygoscelis adeliae* durante el periodo de crianza en Punta Stranger, isla 25 de Mayo, Shetland del Sur, Antártida], *Museo Regionale di Scienze Naturali. Bollettino*, 1995, 13(2), p.377-383, In Spanish with English and Italian summaries. 24 refs.

The diet of the Adélie penguin *Pygoscelis adeliae* was studied at Stranger Point during the post-hatching period by quantitative analysis of adult stomach contents. Euphausiids occurred in 100% of the stomach contents and represented 98.5% by weight of the total prey items. Fish occurred in 83% and only represented 1.4% by weight. Amphipods were present in small amounts. Antarctic krill *Euphausia superba* was the predominant component throughout the sampling period. In contrast, *Euphausia crystallorophias* occurred rarely. *Pleuragramma antarcticum* comprised the bulk of the fish portion. (Auth. mod.)

#### B-56969

Weimerskirch, H., Brothers, N., Jouventin, P., **Population dynamics of wandering albatross *Diomedea exulans* and Amsterdam albatross *D. amsterdamensis* in the Indian Ocean and their relationships with long-line fisheries: conservation implications**, *Biological conservation*, Feb.-Mar. 1997, 79(2-3), p.257-270, Refs. p.269-270.

Studies carried out over the past three decades at Crozet and Kerguelen islands in the Indian Ocean indicate that wandering albatross *Diomedea exulans* populations declined markedly, but since 1986 have shown slow recovery. The population of the endangered Amsterdam albatross *Diomedea amsterdamensis* appears to have similarly recovered since 1985, but remains close to extinction. A demographic study of the Crozet population indicates that the earlier decline was mainly the result of increased adult mortality, and secondarily of low-recruitment. Satellite tracing studies of breeding birds and band recoveries of non-breeding birds indicate that during and outside the breeding season these populations are in contact with long-line fisheries. Decreased fishing effort and a concentration outside the central Indian Ocean by the Japanese fishery during recent years has probably resulted in the slow recovery of these albatross populations as a result of improved adult survival and recruitment. Long-line fisheries still represent a major threat to great albatross populations, most of which are still declining in the southern ocean. (Auth. mod.)

#### B-56970

Atkinson, A., Shreeve, R.S., Pakhomov, E.A., Priddle, J., Blight, S.P., Ward, P., **Zooplankton response to a phytoplankton bloom near South Georgia, Antarctica**, *Marine ecology progress series*, Dec. 5, 1996, 144(1-3), p.195-210, Refs. p.208-210.

A shelf site near South Georgia was sampled during a spring bloom in Jan. 1994. Chlorophyll *a* (chl *a*) values declined from 19 to 6  $\text{mg/m}^3$  during the 8 d of sampling. The bloom comprised mainly long pennate diatoms and large colonies of centric diatoms; a 200  $\mu\text{m}$  sieve retained over two-thirds of the chl *a*. Mesozooplankton biomass was high, 12.3 g dry mass/ $\text{m}^2$  within the top 200 m, and comprised mainly copepods. A series of Longhurst Hardy Plankton Recorder profiles showed that the numerical dominants (*Oithona similis*, *Drepanopus forcipatus* and pteropods) resided mainly within the top 20 m, whereas the large, biomass-dominant copepods had secondary maxima rather deeper within the thermocline. Diel vertical migration was not a feature of this community, being limited to metridiid and euchaetiid copepods. Gut fluorescence measurements on 7 large copepod species showed that all fed during both day and night, although guts tended to be fullest during afternoon and night. (Auth. mod.)

#### B-56971

Boucher, N.P., Prézelin, B.B., **In situ biological weighting function for UV inhibition of phytoplankton carbon fixation in the Southern Ocean**, *Marine ecology progress series*, Dec. 5, 1996, 144(1-3), p.223-236, Refs. p.234-236.

A daily integrated *in situ* biological weighting function (BWF) for inhibition of primary production by ultraviolet radiation (UVR, 280-400 nm) was determined for a natural community of antarctic diatoms maintained under daylight conditions. In the early austral spring of 1993 near Palmer Station surface samples were maintained in 6 spectrally distinct outdoor incubators over the course of a single day and the spectral sensitivity of photosynthetic carbon fixation rates and phytoplankton pigmentation was quantified. The changes in spectral sensitivity to ozone-dependent UV-B (280-320 nm radiation) and ozone-independent UV-A (320-400 nm radiation) was resolved on time scale of 2 h intervals over the course of the 10 h incubation. The UV-B portion of the solar spectrum photoinhibited daily rates of primary production by 15%, while UV-A was responsible for a 19% reduction in daily averaged rates of carbon fixation. (Auth. mod.)

#### B-56972

Mura, M.P., Agustí, S., **Growth rates of diatoms from coastal Antarctic waters estimated by *in situ* dialysis incubation**, *Marine ecology progress series*, Dec. 5, 1996, 144(1-3), p.237-245, Refs. p.245.

Growth rates of phytoplankton (cell diameter <200  $\mu\text{m}$ ) were examined using dialysis bags incubated *in situ* at 3 coastal sites around the Antarctic Peninsula during the austral summer of 1994. The phytoplankton community was dominated by diatoms of the genera *Thalassiosira* sp., *Nitzschia* sp., and *Chaetoceros* sp. The picophytoplankton community (cell diameter <5  $\mu\text{m}$ ) did not increase inside the dialysis bags; however, the diatom populations grew at high growth rates. The growth rates of diatoms measured in the natural community were, however, close to 0, indicative of a close balance between growth and losses. The highest observed growth rates closely approached the maximal predicted growth rates from the cell size of the diatoms for the *in situ* temperature of 1.5°C. These results indicate that coastal antarctic phytoplankton can grow at or near, the maximal rates at the low *in situ* temperatures. The observation that loss rates are similar to population growth rates helps explain the low biomass of coastal antarctic phytoplankton relative to the high nutrient availability in these waters. (Auth.)

#### B-56973

Wright, S.W., Thomas, D.P., Marchant, H.J., Higgins, H.W., Mackey, M.D., Mackey, D.J., **Analysis of phytoplankton of the Australian sector of the Southern Ocean: comparison of microscopy and size frequency data with interpretations of pigment HPLC data using the 'CHEMTAX' matrix factorisation program**, *Marine ecology progress series*, Dec. 5, 1996, 144(1-3), p.285-298, Refs. p.296-298.

A new matrix factorization program 'CHEMTAX' was used to interpret high-performance liquid chromatography (HPLC) pigment data from a transect between Prydz Bay and Australia during Mar. 1987. The program calculated the abundance of diatoms, dinoflagellates, haptophytes resembling *Emiliania huxleyi*, haptophytes resembling *Phaeocystis antarctica*, cyanobacteria, prasinophytes, chlorophytes and cryptophytes



along the transect. The results were compared with those of microscopy and particle size analysis. The transect was dominated by small cells. Numbers of diatoms (most <20 µm in size) increased markedly south of the Polar Front, correlating with the concentration of silica. Dinoflagellate numbers were relatively constant along the transect. Interpretation of HPLC pigment data using the CHEMTAX program was consistent with microscopical analysis. The computed abundances of diatoms and dinoflagellates correlated more strongly with the numbers of small (<20 µm) diatoms and dinoflagellates, respectively, than with large ones. Computed cyanobacterial abundances correlated well with microscopical observations except for small errors where cyanobacteria were absent. The program was able to distinguish 2 populations of haptophytes along the transect, representing *P. antarctica* and coccolithophorids. (Auth. mod.)

#### B-56997

Boussès, P., Reale, D., **Insularity syndrome in *Ovis musimon* on Kerguelen Is.** [Syndrome d'insularité dans une population récente de Mouflons (*Ovis musimon*) des îles Kerguelen], *Vie et milieu*, Sep.-Dec. 1996, 46(3-4), p.285-290, In French with English summary. Refs. p.289-290.

The Haute I. population of mouflons (*Ovis musimon*), in the Kerguelen subantarctic archipelago, originated from a pair introduced in 1957. Despite a recent origin, this population presents several characteristics of the insularity syndrome. In particular, density compensation (up to 100 ind./km<sup>2</sup>) and demographic instability, with successive periods of rapid population growth and massive die-off, were observed. Morphometric changes were also noticed, this mouflon being smaller than its congeners from continental Europe. Size reduction occurred only after the 70s, and is probably a consequence of the degradation of food resources after habitat saturation. Though most of the peculiarities observed in this population are probably phenotypic responses to environmental constraints, the occurrence of a demographic cycle introduced a strong selective force susceptible to induce some rapid evolutionary changes. (Auth.)

#### B-56998

Barnaud, G., Chapuis, J.L., **Eradication of introduced mammals in the subantarctic islands** [Questions scientifiques et éthiques relatives à la restauration des systèmes insulaires. L'éradication des mammifères introduits dans les îles subantarctiques françaises], *Vie et milieu*, Sep.-Dec. 1996, 46(3-4), p.291-303, In French with English summary. Refs. p.300-303.

Islands are famous as benefit fields for the development of biogeographical and ecological theories. Simultaneously, they have been affected by primary and secondary impacts from alien species, especially in the case of mammals. These singular areas constitute the favorite sites for launching ambitious programs for conservation of nature including restoration actions by eradication of introduced species. These interventions, by their experimental aspect, correspond to basic and applied research opportunities but, by implementing them, the scientist is forced to think about the ecological and socio-economic consequences of his activity. This ethical framework is in the process of formulation thanks to the progress in the Conservation Biology science. The example of subantarctic islands illustrates these different issues. (Auth.)

#### B-56999

Pisanu, B., Chapuis, J.L., Combes, O., Durette-Desset, M.C., **Gastrointestinal helminths from sheep introduced to the Kerguelen Is.** [Richesse spécifique en Helminthes gastro-intestinaux du Mouton (*Ovis aries*) et du Mouflon (*Ovis musimon*) introduits dans l'archipel de Kerguelen], *Vie et milieu*, Sep.-Dec. 1996, 46(3-4), p.305-312, In French with English summary. Refs. p.310-312.

The population of sheep (*Ovis aries*) from Longue I. originated from more than a hundred of individuals introduced between 1949 and 1980, while the population of mouflon (*Ovis musimon*), from Haute I., results from a couple brought in 1957. The known origins of the founders, the simplicity and the isolation of these insular ecosystems, and the biological characteristics of these two populations lead to a compared analysis of some factors acting on their specific richness in helminths. Five nematode species were identified from the autopsy of 24 digestive tracts of mouflon and 6 nematode species from the digestive tracts of 4 sheep. The results show that the specific richness in gastrointestinal helminths for these two

hosts is equivalent and poor in species. Some hypotheses are advanced to explain the origin and the nature of the parasite spectrum of these two introduced ungulates. (Auth.)

#### B-57000

Kirkwood, R., Robertson, G., **Energy assimilation efficiency of emperor penguins, *Aptenodytes forsteri*, fed a diet of antarctic krill, *Euphausia superba***, *Physiological zoology*, Jan./Feb. 1997, 70(1), p.27-32, 21 refs.

Krill assimilation efficiency of nonbreeding emperor penguins from the Auster colony, Mawson Coast, was assessed in June 1993. Captive emperor penguins hand-fed antarctic krill assimilated an average of 70.5% (n=3) of the energy in the diet. Water intake estimated by tritiated water turnover was 9.4±2.4% less than that measured gravimetrically. Tritium took 1.5 h from injection to equilibrate with the penguins' body water pools. (Auth. mod.)

#### B-57001

Chown, S.L., Van der Merwe, M., Smith, V.R., **Influence of habitat and altitude on oxygen uptake in sub-Antarctic weevils**, *Physiological zoology*, Jan.Feb. 1997, 70(1), p.116-124, Refs. p.122-124.

Whole-organism oxygen uptake rate and its temperature sensitivity (determined using regression analyses and estimates of Q<sub>10</sub>) were examined in 6 closely related weevil species from Marion I. over a short time period and using the same methods. *Bothrometopus elongatus*, *B. parvulus*, and the two *Ectemnorhinus* species have populations at both high and low elevations, and pairwise comparisons of these species were made. Regressions of the log of oxygen uptake rate on temperature and Q<sub>10</sub> values revealed that the *Ectemnorhinus* species have a significantly greater thermal sensitivity than do species in the genera *Bothrometopus* and *Palirhoeus*. This may be considered an adaptation of the former to their moist lowland habitats and the requirements of angiosperm-feeding in *E. similis*. It is argued that elevated oxygen uptake rates and reduced slopes of the regression of the log of oxygen uptake rate on temperature in species and populations from high altitudes compared with those from low elevations provide evidence for metabolic cold adaptation. (Auth. mod.)

#### B-57004

Marshall, J.D., Pirrie, D., Clarke, A., Nolan, C.P., Sharman, J., **Stable-isotopic composition of skeletal carbonates from living Antarctic marine invertebrates, *Lethaia***, June 1996, 29(2), p.203-212, 39 refs.

The carbon and oxygen stable-isotopic composition of the shells of 4 invertebrate species from Signy I. has been determined. The two species of bivalve (*Laternula elliptica*, *Yoldia eightsi*), a brachiopod (*Liothyrella uva*) and a gastropod (*Nacella concinna*), inhabit slightly different shallow marine environments, have different feeding strategies, and represent both calcitic and aragonitic shells. Oxygen isotopic values range from +0.8 to +3.8 per mill PDB and can vary by more than 2 per mill within individual shells. There is 0.3-2 per mill variation between the final increments of shells of the same species. The most positive values are compatible with equilibrium precipitation from ambient seawater. The range and variability of isotopic composition in samples collected from an environmentally stable site demonstrates the potential for inherent inhomogeneity in the isotopic record and provides a cautionary tale for those attempting to interpret similar data sets from the fossil record. (Auth. mod.)

#### B-57008

Erséus, C., **Taxonomy of *Capilloventer* (Capilloventridae), a little-known group of aquatic Oligochaeta, with descriptions of two new species**, *Journal of natural history*, Sep./Oct. 1993, 27(5), p.1029-1040, 17 refs.

#### DLC QH1.A614

*Capilloventer antarcticus* sp. nov., from the Weddell Sea and *C. australis* sp. nov., from low-salinity habitats in the Hawkesbury estuary near Sydney, Australia, are described. Both species are similar to *C. atlanticus* Harman and Loden, from Brazil, hitherto the only known member of the family Capilloventridae. *Capilloventer* appears to be representative of the most ancestral Citellata (Euclitella *sensu* Jamieson). The morphology and arrangement of its somatic setae resemble those of some polychaetes. Both the dorsolateral and the ventrolateral bundles contain hair setae as



well as bifid or single-pointed crotchets and, in each segment, the bundles of one side are located closely together and widely separated from those of the other side. (Auth.)

#### B-57032

Pugh, P.J.A., Davenport, J., **Colonisation vs. disturbance: the effect of sustained ice-scouring on intertidal communities**, *Journal of experimental marine biology and ecology*, Feb. 25, 1997, 210(1), p.1-21, Refs. p.19-21.

Shoreline plant and animal communities close to a retreating tidewater glacier on South Georgia displayed a series of physical and biological gradients from the open sea to the glacier terminus. These included increasing scoring intensity caused by floating and/or grounded ice fragments as well as decreasing diversity and abundance of both macroflora and macrofauna. The correlation between gradients suggests that shoreline scoring intensity can be directly quantified from plant diversity and abundance, and that the colonization of coastlines exposed to sustained ice-scoring is not stochastic like that following single massive ice-scoring events, but directional like recovery from small scale disturbance events is much more rapid than that associated with continual scoring. Indeed recovery from continual scoring is so protracted that affected shores are held for a prolonged period at a particular phase of the normal spring annual spring colonization process by local ice-scoring intensity. (Auth.)

#### B-57033

Coggan, R., **Growth:Ration relationships in the antarctic fish *Notothenia coriiceps* Richardson maintained under different conditions of temperature and photoperiod**, *Journal of experimental marine biology and ecology*, Feb. 25, 1997, 210(1), p.23-35, Refs. p.34-35.

Four feeding trials were conducted on captive juvenile *N. coriiceps* maintained under conditions simulating natural seasonal changes in temperature and photoperiod. Fish were deprived of food for 10 days (to measure fasting body weight), then fed for 12 days on freshly killed amphipods (to measure individual daily intake). Thereafter, one group was left unfed whilst daily intake of other individuals, offered 2 g and 4 g daily, was monitored. Growth was measured as change in body weight. Growth:Ration relationships were compared between trials and were found to be independent of the different environmental conditions. Appetite was higher under summer conditions and it is argued that seasonality in growth of antarctic fish is mediated through seasonal variation in resource utilization rather than seasonal resource availability or temperature-dependent effects on growth. (Auth.)

#### B-57036

Froneman, P.W., Perissinotto, R., **Microzooplankton grazing and protozooplankton community structure in the South Atlantic and in the Atlantic sector of the Southern Ocean**, *Deep-sea research*, May 1996, 43(5), p.703-721, Refs. p.718-721.

Microzooplankton grazing and protozooplankton community structure in the South Atlantic Ocean were investigated during Jan./Feb., 1993. Grazing rates and numerical abundances of protozooplankton were estimated in the surface waters and at the subsurface chlorophyll maximum (SCM) by employing the dilution technique and epifluorescent microscopy. Protozooplankton abundance co-varied with chlorophyll concentrations at both depths. Nanoheteroflagellates (<20 µm) dominated numerically at all stations while the >20 µm component was dominated by ciliates, comprising aloricate ciliates and tintinnids. Instantaneous growth rates of alga along the transect ranged between 0.24 and 1.86/day in surface waters and between 0.06 and 1.87/day at the SCM. Instantaneous grazing rates of microzooplankton on phytoplankton varied from 0 to 0.33/day in the surface waters and between 0 and 0.58/day at the SCM. This level of grazing corresponds to a daily loss of 0-23% of the initial standing stock (0-46% of potential production) in the surface waters and between 0 and 44% (0-60% of potential production) of the initial standing stock at the SCM. (Auth. mod.)

#### B-57037

Moline, M.A., Prézelin, B.B., **Long-term monitoring and analyses of physical factors regulating variability in coastal Antarctic phytoplankton biomass, *in situ* productivity and taxonomic composition over subseasonal, seasonal and inter-**

**annual time scales**, *Marine ecology progress series*, Dec. 31, 1996, 145(1-3), p.143-160, Refs. p.158-160.

A 3 yr high-resolution temporal database related to phytoplankton dynamics was collected during the austral spring/summer periods of 1991 to 1994 in shelf waters adjacent to Palmer Station. Here, the database is used to quantify the variability in phytoplankton biomass, *in situ* productivity and taxonomic composition over subseasonal, seasonal and interannual time scales; to elucidate environmental mechanisms controlling these temporal patterns; and to ascertain which phytoplankton markers are most suitable for detecting longer-term (i.e. decadal) trends in phytoplankton dynamics in coastal waters of the southern ocean. The Long-Term Ecological Research (LTER) coastal study sites showed high interannual variability in peak phytoplankton biomass and integrated primary production. Seasonal and annual patterns in biomass and productivity were shown to be driven by shorter-time-scale physical forcing by local wind stress. Low daily wind speeds were associated with water-column stabilization. Despite the high seasonal and interannual variability in biomass and associated *in situ* productivity in this coastal environment, the replacement sequence of one dominant phytoplankton group by another was very similar on subseasonal time scales for all 3 years. (Auth. mod.)

#### B-57039

Spiridonov, V.A., Nöthig, E.M., Schröder, M., Wisotzki, A., **Onset of biological winter in the eastern Weddell gyre (Antarctica) planktonic community**, *Journal of marine systems*, Dec. 1996, 9(3-4), p.211-230, Refs. p.227-230.

Data on hydrography, phyto- and zooplankton, obtained on a transect along the 0° meridian during the Winter Weddell Gyre Study, June 1992, revealed peculiarities of the early winter situation in the eastern Weddell Gyre. The vertical distribution and developmental stage composition of *Rhincalanus gigas*, *Calanoides acutus*, *Calanus propinquus* and krill, *Euphausia superba* larvae, were a good index for a general assessment of the seasonal condition of the plankton communities. There were five zones differing in seasonal situation: (1) the Polar Front and the southern ACC (not studied in detail), (2) the Weddell Front, (3) the Weddell Gyre interior, (4) the Maud Rise area, and (5) the Coastal Current zone. In the eastern part of the Weddell Front (compared to the western part) seasonal development of both phytoplankton and herbivorous zooplankton is delayed in spring but prolonged in late autumn. Furthermore, it appears that the Weddell Sea ecosystem exhibits a much higher degree of spatial and temporal variability than thought before. This may have an impact on seasonal patterns of organic carbon transport from the pelagic realm to deeper water layers and to the sediment. (Auth. mod.)

#### B-57040

Page's, F., Schnack-Schiel, S.B., **Distribution patterns of the mesozooplankton, principally siphonophores and medusae, in the vicinity of the Antarctic Slope Front (eastern Weddell Sea)**, *Journal of marine systems*, Dec. 1996, 9(3-4), p.231-248, 19 refs.

The composition, abundance and vertical distribution of mesozooplankton, particularly siphonophores and medusae (27 species), collected along two transects in the eastern Weddell Sea have been analyzed. Both transects were characterized by a steep thermocline that on approaching the coastline defined the Antarctic Slope Front. The front acted as a strong boundary in the shelf-slope and caused a pronounced cross frontal gradient in the populations of cnidarians. Few species and low abundances were found in the upper cold waters and most of the populations concentrated in and below the thermocline. The analysis of the gastrozooids of the physonect siphonophore *Pyrostephos vanhoeffeni* showed a wide variety of prey but the relatively high contribution of krill larvae reveals a substantial trophic impact when both organisms co-occur. (Auth.)

#### B-57041

Albers, C.S., Kattner, G., Hagen, W., **Compositions of wax esters, triacylglycerols and phospholipids in arctic and antarctic copepods: evidence of energetic adaptations**, *Marine chemistry*, Dec. 1996, 55(3-4), p.347-358, 40 refs.

The fatty acid and fatty alcohol compositions of wax esters, triacylglycerols and phospholipids were determined in the antarctic copepods. The wax esters of the herbivorous species were clearly characterized by the long-chain monounsaturated fatty acids and alcohols, whereas the



omnivorous and carnivorous species usually had high relative amounts of fatty acids and of short-chain saturated alcohols. The wax ester-storing herbivorous species have developed similar lipid biochemical adaptations in both polar oceans. In contrast, predominantly triacylglycerol-storing species occur only in antarctic waters. In both, arctic and antarctic species, the fatty acid compositions of the phospholipids showed a pronounced uniformity. The extremely high degree of unsaturation is extraordinary as compared to other marine taxa. (Auth. mod.)

#### B-57043

Siegel, V., Harm, U., **Composition, abundance, biomass and diversity of the epipelagic zooplankton communities of the southern Bellingshausen Sea (Antarctic) with special reference to krill and salps**, *Archive of fishery and marine research*, 1996, 44(1-2), p.115-139, With German and French summaries. Refs. p.135-139.

Zooplankton was sampled in the southern Bellingshausen Sea during the summer of 1994. A total of 121 zooplankton species were found. Although zooplankton diversity was high in oceanic and neritic waters, abundances and biomass were among the lowest recorded for antarctic epipelagic zooplankton. Copepods and chaetognaths dominated numerically, while chaetognaths and krill *Euphausia superba* dominated in biomass wet weight. *Salpa thompsoni* occurred in low densities. Density values for *E. superba*, biomass was lower than generally found on the Antarctic Peninsula and Elephant I. A distinct spatial separation for size groups was observed for salps, *Euphausia crystallorophias* and krill. These findings are discussed in the light of recently described correlations between winter sea-ice conditions and krill spawning and recruitment success, leading to the conclusion that recruitment of the 1993-94 krill year-class will be poor. (Auth. mod.)

#### B-57044

Nichols, D.S., Hart, P., Nichols, P.D., McMeekin, T.A., **Enrichment of the rotifer *Brachionus plicatilis* fed an Antarctic bacterium containing polyunsaturated fatty acids**, *Aquaculture*, Nov. 20, 1996, 147(1-2), p.115-125, Refs. p.124-125.

The antarctic bacterium, strain ACAM 456, is known to produce eicosapentaenoic acid (20:5n-3, EPA). Following growth in batch culture, suspensions of this bacterium, at initial concentrations of  $10^7$ ,  $10^8$  and  $10^9$  cells/ml, were used as foods for 3 respective cultures of the rotifer *Brachionus plicatilis*. At 6 and 24 h, rotifers were removed, harvested and extracted for analysis of fatty acid composition, which was compared to that of rotifers grown on baker's yeast. Incorporation of EPA, along with bacterial fatty acid markers (i13:0, i15:0 and 14:0), was evidenced at all bacterial food concentrations tested. The highest observed incorporation occurred when rotifers were grown in the medium initially containing  $10^9$  bacteria/ml. After 24 h of feeding, the level of EPA reached 9.4% of total fatty acids in the fed rotifers (6.7 ng of EPA/rotifer). (Auth. mod.)

#### B-57045

Peña Cantero, A.L., Svoboda, A., Vervoort, W., **Species of *Staurotheca* Allman, 1888 (Cnidaria: Hydrozoa) from recent antarctic expeditions with R.V. *Polarstern*, with the description of six new species**, *Journal of natural history*, Mar. 1997, 31(3), p.329-381, Refs. p.378-381.

Thirteen species of the genus *Staurotheca* Allman, 6 of which are new to science, have been studied. The material originates from the Weddell Sea region and was collected by several antarctic expeditions with the R.V. *Polarstern*. Each species is illustrated, and its systematic position among allied species is discussed. Current data concerning autecology and geographic distribution of each species are presented. Redefinitions of the genera *Staurotheca* Allman and *Thuiaria* Fleming are given. The species formerly referred to the genus *Selaginopsis* Allman, and found in the Southern Hemisphere, are included in *Staurotheca*, while the northern ones are found in *Thuiaria*. (Auth.)

#### B-57049

Arrigo, K.R., Worthen, D.L., Lizotte, M.P., Dixon, P., Dieckmann, G., **Primary production in antarctic sea ice**, *Science*, Apr. 18, 1997, 276(5311), p.394-397, 16 refs.

A numerical model shows that in antarctic sea ice, increased flooding in regions with thick snow cover enhances primary production in the infiltration (surface) layer. Productivity in the freeboard (sea level) layer is also determined by sea ice porosity, which varies with temperature. Spatial and temporal variation in snow thickness and the proportion of first-year ice thus determine regional differences in sea ice primary production. Model results show that of the 40 teragrams of carbon produced annually in the antarctic ice pack, 75% was associated with first-year ice and nearly 50% was produced in the Weddell Sea. (Auth.)

#### B-57055

Marshall, W.A., **Aerial dispersal of lichen soredia in the maritime Antarctic**, *New phytologist*, Nov. 1996, 134(3), p.523-530, 45 refs.

An aerobiological monitoring program was carried out for over a year on Signy I. Collections were made using arrays of rotorod samplers at 3 sites. Lichen soredia were found to be the most abundant airborne propagules, more so than ascospores, the sexual propagules of lichen fungi. The dominance of soredia over ascospores appeared to decrease with increasing maturity of fellfield sites. No correlations were found with temperature, relative humidity or wind speed. Collections at 1 m above ground level were shown not to be significantly different to those at 0.15 m at 2 of the sites. Size range distribution also differed at 2 of the sites. Soredial clumps in excess of 100  $\mu$ m in diameter were collected at 1 m above ground level and at some distance from potential source plants, though most fell in the range 30-60  $\mu$ m. Peaks in numbers of air borne soredia were found after winter snow melt, demonstrating that soredial production continues at subzero temperatures. (Auth.)

#### B-57059

Reinhardt, K., Blechschmidt, K., Peter, H.U., Montalti, D., **Hitherto unknown hybridization between Chilean and South Polar Skua**, *Polar biology*, Feb. 1997, 17(2), p.114-118, 21 refs.

Three skua specimens with a coloration pattern of the Chilean skua were observed at Potter Peninsula, King George I. Two of these were breeding birds. However, they showed a pattern of mitochondrial DNA typical for South Polar skua. These birds thus represent hybrids originating from male Chilean skua. The third bird could not be caught. It appeared to be indistinguishable from Chilean skua. (Auth.)

#### B-57060

Tremblay, Y., Guinard, E., Cherel, Y., **Maximum diving depths of northern rockhopper penguins (*Eudyptes chrysocome moseleyi*) at Amsterdam Island**, *Polar biology*, Feb. 1997, 17(2), p.119-122, 30 refs.

The mean maximum dive depth from 49 foraging bouts by northern rockhopper penguins, measured using capillary-tube depth gauges, was  $66 \pm 4$  m (12-168 m). There were no differences in the maximum dive depths between male and female penguins. Northern rockhopper penguins dived deeper in early than in late creche stages ( $83 \pm 7$  vs  $57 \pm 4$  m), and this was associated with probable dietary changes, squid dominating the diet by mass (44%) in Nov., and fish (64%) in Dec. 1994 at Amsterdam I. (Auth.)

#### B-57061

Ahn, I.Y., Chung, H.S., Kang, J.S., Kang, S.H., **Diatom composition and biomass variability in nearshore waters of Maxwell Bay, Antarctica, during the 1992/1993 austral summer**, *Polar biology*, Feb. 1997, 17(2), p.123-130, 41 refs.

Diatom composition and biomass were investigated in the nearshore water (<30 m in depth) of Maxwell Bay during the 1992-93 summer; epiphytic or epilithic diatoms *Fragilaria striatula*, *Achnanthes brevipes* var. *angustata* and *Licmophora* spp. were dominant. Within the bay, diatom biomass in surface water was highest at the nearshore stations. Benthic forms accounted for >90% of diatom carbon at all nearshore stations, while at the offshore stations planktonic forms, such as *Thalassiosira antarctica* predominated (50->90%). Microscopic examination revealed that many of these diatoms have become detached from a variety of macroalgae growing in the intertidal and shallow subtidal bottoms. Epiphytic diatoms persistently dominated during a 19-day period in the water column at a fixed nearshore station; there biomass fluctuated from 0.86 to 53  $\mu$ g/Cl.



A positive correlation between diatom biomass and wind speed strongly suggests that wind-driven resuspension of benthic forms is the major mechanism increasing diatom biomass in the water column. (Auth. mod.)

# B-57062

De Moreno, J.E.A., Gerpe, M.S., Moreno, V.J., Vodopivec, C., **Heavy metals in Antarctic organisms**, *Polar biology*, Feb. 1997, 17(2), p.131-140, Refs. p.139-140.

To evaluate levels of essential (zinc and copper) and non-essential (mercury and cadmium), heavy metals in 34 species of organisms from different areas close to the Antarctic Peninsula, were analyzed. These included algae, filter-feeders, omnivorous invertebrates and vertebrates. Mercury was not detected, while cadmium was found in the majority of organisms analyzed; detection limit was 0.05 ppm for both metals. The highest cadmium concentration was observed in the starfish *Odontaster validus*. Anthozoans, sipunculids and nudibranchs showed maximum levels of zinc, while the highest copper level was found in the gastropod *Trophon brevispira*. Mercury and cadmium levels in fishes were below the detection limit. Concentrations of essential and non-essential metals in birds were highest in liver followed by muscle and eggs. Cadmium and mercury levels in muscle of southern elephant seals were above the detection limit, whereas in antarctic fur seals they were below it. The objective of the study was to gather baseline information for metals in antarctic ocean biota that may be needed to detect, measure and monitor future environmental changes. (Auth.)

# B-57063

Clayton, M.N., Wiencke, C., Klöser, H., **New records of temperate and sub-Antarctic marine benthic microalgae from Antarctica**, *Polar biology*, Feb. 1997, 17(2), p.141-149, Refs. p.148-149.

Among the algae collected around the South Shetland Is. and the Antarctic Peninsula were 3 new records for Antarctica: *Petalonia fascia*, *Enteromorpha intestinalis*, *Rhodomenia subantarctica* and 7 other species: *Scytosiphon simplicissimus*; *Chordaria linearis*; *Halopteris obovata*; *Acrosiphonia arcta*; *Enteromorpha compressa*; *Bangia atropurpurea* and *Porphyra plocamiestris* that had been reported previously. The 10 species detailed in this paper fall into two groups: 4 species previously known from subantarctic islands and/or locations in southern South America, and 6 species having a wider distribution in temperate regions. The possibility that the less accessible subtidal habitats of some species may have prevented earlier discovery is discussed. Other species may be comparatively recent adventives, most likely introduced with shipping. In view of possible global climate changes, species of this latter group are regarded as suitable organisms for monitoring changes of water temperature. (Auth. mod.)

# B-57064

Hofmeyr, G.J.G., Bester, M.N., Jonker, F.C., **Changes in population sizes and distribution of fur seals at Marion Island**, *Polar biology*, Feb. 1997, 17(2), p.150-158, Refs. p.157-158.

Population censuses of the antarctic fur seal (*Arctocephalus gazella*) and the subantarctic fur seal (*A. tropicalis*) were conducted during the 1994-95 breeding season at Marion I. Pup numbers, determined from direct counts and a mark-recapture experiment, were used to estimate population sizes. Pup numbers of *A. tropicalis* showed a mean annual change of 2.0% over the previous 6 years, culminating in an estimated total population of 49,523 for 1994-95. The population appears to be entering the maturity phase of population growth and may therefore have recovered from the effects of uncontrolled sealing that ended in the early 20th century. Numbers at the major colonies on Marion I. showed little change since 1989 and these sites may have reached carrying capacity. The extension of breeding to other parts of the island continues. Over the same period, *A. gazella* pup numbers showed a mean annual change of 17%, and the total population numbered 1,205 in 1994-95. This species has possibly entered the rapid recolonization phase of population growth. A few hybrid seals were found. (Auth.)

# B-57065

Gibson, J.A.E., Swadling, K.M., Pitman, T.M., Burton, H.R., **Overwintering populations of *Mesodinium rubrum* (Ciliophora: Haptorida) in lakes of the Vestfold Hills, East Antarc-**

**tica**, *Polar biology*, Feb. 1997, 17(2), p.175-179, 18 refs.

The autotrophic ciliate *Mesodinium rubrum* Lohmann was observed during winter and spring in saline lakes ranging in salinity from 2 to 78 per mill in the Vestfold Hills. The ciliate remained active during winter, and contained chlorophyll even though the level of light available for photosynthesis was minimal. No evidence of encystment as a means of survival during winter was observed. A seasonal study in Ace Lake revealed that *M. rubrum* was present throughout the year at abundances ranging from  $1 \times 10^4$  to  $3.5 \times 10^5$  cells/l. During the winter period, when little light penetrated the lake's ice cover, cells were most common immediately under the ice at 2 m, where cell numbers were typically  $8 \times 10^4$  cells/l. (Auth.)

# B-57066

Hennion, F., Walton, D.W.H., **Seed germination of endemic species from Kerguelen phytogeographic zone**, *Polar biology*, Feb. 1997, 17(2), p.180-187, 17 refs.

Seeds of 6 endemic species and 2 circumpolar species were collected from several sites on Kerguelen Is. and tested for germination between 5 and 25°C on thermogradient bars. *Pringlea antiscorbutica* and *Colobanthus kerguelensis* had a near 100% viability with an initial germination temperature of ca. 24°C. *Colobanthus* attained nearly 10% viability from 5 to 25°C, whereas *Pringlea* germination declined markedly below 20°C. In *Poa kerguelensis* and *P. cookii* germination was poor and varied between sites. The 3 *Ranunculus* spp. showed various degrees of dormancy. In *Lyallia kerguelensis*, although the seed appeared mature, a variety of treatments could only partly release an apparently deep dormancy. These data are discussed with respect to field observations on reproduction from seed. (Auth.)

# B-57067

Bornemann, H., Mohr, E., Plötz, J., **Why does apomorphine fail in Weddell seals?**, *Polar biology*, Feb. 1997, 17(2), p.188-190, 25 refs.

The emetics apomorphine hydrochloride and emetine dihydrochloride were tested on Weddell seals (*Leptonychotes weddellii*) to obtain stomach contents for dietary studies. The drugs prostaglandin F<sub>2</sub>α, carbachol, and hydergine, which have emetic side effects, were also used. None of the drugs induced regurgitation and possible reasons for this are discussed. (Auth.)

# B-57075

Melick, D.R., Seppelt, R.D., **Vegetation patterns in relation to climatic and endogenous changes in Wilkes Land, continental Antarctica**, *Journal of ecology*, Feb. 1997, 85(1), p.43-56, 35 refs.

The present paper summarizes five years of experiments and field observations which examine the status of the Windmill Is. flora and the likely contributions of climatic and endogenous changes to altering the plant communities. Seral stages of mixed bryophyte and lichen communities are identified and correlated with environmental factors. Since environmental conditions in Antarctica vary enormously over the year, microclimate data measured over a 4-year period are related to the distribution and dynamics of significant plant species—the time available for growth of major moss and lichen species are estimated and the recovery potential of lichenized mosses are examined. Recent climatic trends in the Windmill Is. are determined from analyses of available meteorological records. The possible timescales of plant successions are also examined in the light of glaciological and geomorphological evidence of long-term environmental change in this region. (Auth. mod.)

# B-57077

Hansson, L.A., Tranvik, L.J., **Algal species composition and phosphorus recycling at contrasting grazing pressure: an experimental study in sub-Antarctic lakes with two trophic levels**, *Freshwater biology*, Feb. 1997, 37(1), p.45-53, Refs. p.52-53.

To test the response of algal communities to altered grazer abundance in lakes lacking efficient predators on herbivores, the authors performed field and experimental studies in two South Georgia lakes. The number of algal species in these high latitude lakes, is low, and all dominant species have grazer-resistant adaptations. Algal community composition was only slightly changed by experimentally altered grazer abundance, indicating that it was already adapted for a high grazing pressure. The diets of herbi-



vores were restricted to vulnerable food organisms such as *Mallomonas* sp. and heterotrophic flagellates in the water column, and to benthic food sources. At high grazer abundance, the concentration of available phosphorus ( $\text{PO}_4\text{-P}$ ) in the water was lower than at low grazer abundances, due to inefficient nutrient regeneration by the copepod herbivores. In lakes where copepods are dominant grazers, algae suffer both directly from grazing and indirectly from reduced nutrient availability. (Auth. mod.)

#### B-57078

Howell, S.N.G., Ainley, D.G., Webb, S., Hardesty, B.D., Spear, L.B., **New information on the distribution of three species of Southern Ocean gadfly petrels (*Pterodroma* spp.), *Notornis***, June 1996, 43(2), p.71-78, Refs. p.77-78.

The authors present new distributional data from the eastern South Pacific Ocean for the White-headed petrel (*Pterodroma lessonii*), Kerguelen petrel (*P. brevirostris*), and birds showing characters of the endangered Magenta petrel (*P. magentae*). The White-headed petrel nests biennially during Sep.-May south of New Zealand on Auckland I., Antipodes, and Macquarie I., and in the southern Indian Ocean on Kerguelen and Crozet islands. Its pelagic distribution is circumpolar, generally over waters south of 40°S, but reaching a northern limit around 30°S during the height of austral winter. (Auth. mod.)

#### B-57079

Ochyra, R., ***Ditrichum lewis-smithii* (Ditrichaceae, Bryopsida), a new species from Antarctica**, *Annales botanici Fennici*, Dec. 13, 1996, 33(4), p.303-309, 20 refs.

In the antarctic botanical zone the genus *Ditrichum* Hampe (Ditrichaceae, Bryopsida) is represented by three species, *D. austro-georgicum* (Card.) Seppelt, *D. brotherusii* (R. Br. ter.) Seppelt and *D. lewis-smithii* Ochyra sp. nov. The latter is closely related to *D. immersum* Zanten from the Subantarctic. However, *D. lewis-smithii* differs in its gymnostomous capsules, smaller, erecto-patent to widely spreading leaves with flexuose subulae, bistratose lamina cells at the leaf shoulders and mostly 2-3 stratose lamina in the subula. It is an epigeal moss growing on bare ground and on soil covering rock ledges and on humus in rock fissures. It has been recorded so far only from the King George and Livingston Is. in the South Shetland Is., as well as from Signy I. in the South Orkney Is., and must therefore be considered an antarctic endemic. (Auth.)

#### B-57081

Gibson, J.A.E., Swadling, K.M., Burton, H.R., **Acrylate and dimethylsulfoniopropionate (DSMP) concentrations during an antarctic phytoplankton bloom**, Biological and environmental chemistry of DMSP and related sulfonium compounds. Edited by R.P. Kiene, P.T. Visscher, M.D. Keller, and G.O. Kirst. Proceedings of the First International Symposium on DSMP and Related Sulfonium Compounds, held June 5-8, 1995, in Mobile, Alabama, New York, Plenum Press, 1996, p.213-222, 25 refs.

**DLC QK898.D54B56 1996**

Very high concentrations of dimethylsulfide (DMS) and dimethylsulfoniopropionate (DMSP) have been regularly reported from around the antarctic coastline, and have been associated with blooms of the prymnesiophyte alga *Phaeocystis* sp. affin. *antarctica*. In this study, acrylate and DMSP concentrations were measured at an inshore marine site during the 1994-95 summer antarctic phytoplankton bloom. The concentration of DMP was determined by measuring the difference between the amount of acrylate before and after hydrolysis with NaOH. The concentration of acrylate rose from below the detection limit in early Nov. to over 1.20  $\mu\text{M}$  by 7 Dec. Total DMSP also reached a maximum of 2.47  $\mu\text{M}$  on this date. Concentrations then dropped to below the detection limit by the end of Jan. Correlation matrix analysis of acrylate and DMSP concentrations and various parameters revealed significant positive correlations with cell counts of *Cryptomonas* sp., the dominant phytoplankton species during Dec., and dinoflagellates. *Phaeocystis* sp. affin. *antarctica* was present during the study in low numbers and probably contributed little to the DMSP pool. This is the first study which suggests that cryptomonads and dinoflagellates may be important producers of DMSP in the antarctic environment.

#### B-57082

Daly, K.L., DiTullio, G.R., **Particulate dimethylsulfoniopropi-**

**onate removal and dimethylsulfide production by zooplankton in the southern ocean**, Biological and environmental chemistry of DMSP and related sulfonium compounds. Edited by R.P. Kiene, P.T. Visscher, M.D. Keller, and G.O. Kirst. Proceedings of the First International Symposium on DSMP and Related Sulfonium Compounds, held June 5-8, 1995, in Mobile, Alabama, New York, Plenum Press, 1996, p.223-238, 54 refs.

**DLC QK898.D54B56 1996**

The influence of antarctic krill, *Euphausia superba*, on particulate dimethylsulfoniopropionate (DMSP(p)) and dimethylsulfide (DMS) concentrations in surface waters of the southern ocean was investigated by shipboard experiments during austral spring near the Antarctic Peninsula. Chlorophyll concentrations were low in the water column, but substantially higher in sea ice due to the high biomass of ice algae. (DMSP(p)) was associated primarily with diatoms and to a minor extent with *Phaeocystis* spp. in sea ice algae. Maximum DMSP(p) and fucoxanthin concentrations also occurred in the 100-200  $\mu\text{m}$  size fraction. This is interpreted to mean that high biomass of diatoms in sea ice contributes significantly to DMSP(p) pools in the Antarctic. Juvenile krill were the dominant biomass component of the zooplankton community and were often observed grazing along the edge of ice floes. In experiments, krill grazing on phytoplankton or ice algae produced 3 to 16 times the amount of DMS, respectively, relative to that in control bottles without krill. The study indicates that mesozooplankton grazing activity plays a significant role in the release of DMSP and DMS from phytoplankton and ice algae. Because krill feed on ice algae during seasons when phytoplankton production is low, DMS production from grazing occurs during all seasons in the southern ocean. (Auth. mod.)

#### B-57083

Steinke, M., Daniel, C., Kirst, G.O., **DMSP lyase in marine macro- and microalgae. Intraspecific differences in cleavage activity**, Biological and environmental chemistry of DMSP and related sulfonium compounds. Edited by R.P. Kiene, P.T. Visscher, M.D. Keller, and G.O. Kirst. Proceedings of the First International Symposium on DSMP and Related Sulfonium Compounds, held June 5-8, 1995, in Mobile, Alabama, New York, Plenum Press, 1996, p.317-324, 24 refs.

**DLC QK898.D54B56 1996**

The enzymatic cleavage of dimethylsulfoniopropionate (DMSP) to dimethylsulfide (DMS) was investigated in twenty-one strains of marine macro- and microalgae, representing seven algal classes. The enzymes involved in this cleavage are DMSP lyases, producing DMS from DMSP. All algal strains tested were able to synthesize and accumulate various levels of intracellular DMSP but only 12 strains showed DMSP lyase activity. It was possible to identify subgroups of strong and weak DMS producers. The first subgroup included three *Enteromorpha* species (*E. clathrata*, *E. intestinalis*, *E. compressa*) and *Phaeocystis* sp. with specific activities in crude cell extracts ranging from 7 to over 100 nmol DMS/min/(mg cell protein). The second subgroup was composed of a sub-antarctic strain of *Acrosiphonia arcta*, *Polysiphonia lanosa*, two strains of *Emiliania huxleyi*, *Acrosiphonia sonderi*, *Ulva lactuca* and *Enteromorpha bulbosa*. In this subgroup activity ranged from 0.01 to 0.2 nmol DMS/min/(mg cell protein). Non-optimal assay conditions and bacterial contamination may have affected rates in some samples, but the results suggest the widespread presence of DMSP lyase among algal taxa, and also raises the possibility that closely-related species may have quite different lyase activities or function. (Auth. mod.)

#### B-57088

Bathmann, U.V., **Abiotic and biotic forcing on vertical particle flux in the southern ocean**, SCOPE 57. Particle flux in the ocean, edited by V. Ittekkot, P. Schäfer, S. Honjo and P.J. Depetris, Chichester, England, John Wiley & Sons, 1996, p.243-250, Refs. p.248-250.

**DLC GC117.C37P37 1996**

The objective of this paper is to show the importance of physical, chemical and biological constraints for structuring the pelagic ecosystems and determining the eventual fate of the organic matter and the role of zooplankton thereby. Data collected by the author on pelagic system structure, on mechanisms and fluxes within the pelagic realm are reviewed for various scenarios, from different sites in the Weddell Sea, in the course



of a year. It starts with the description of copepod biology in winter along a transect across the ice covered Weddell Sea and continues by presenting three scenarios for pelagic system structure during austral spring and summer (Nov. to Jan.). An autumn situation completes the course through the annual succession within pelagic antarctic ecosystems of the Weddell Sea.

#### B-57090

Rota, E., Erséus, C., **Re-examination of *Grania monochaeta* (Michaelsen) (Oligochaeta: Enchytraeidae), with descriptions of two new species from subantarctic South Georgia**, *Journal of natural history*, Jan. 1997, 31(1), p.27-42, Refs. p.41-42.

A comparative study of some syntypes of *Grania monochaeta* (Michaelsen, 1888) shows that 3 distinct species are involved, containing a mixture of the true *G. monochaeta*, whose description is here presented. For *G. lasserrei* sp. n., additional distinctive characters and an extended variation of the setal distribution are described. The worms studied by Stephenson in 1932 belong to a third species, *G. stephensoniana* sp. n., whose description is also given. The taxonomic confusion associated with *G. monochaeta* is discussed. Due to the lack of records of *Grania* in the neighboring regions, the biogeography of the South Georgian assemblage is far from understood. From the knowledge presently available, *G. lasserrei* sp. n. and *G. stephensoniana* sp. n. exhibit their closest affinities to high antarctic taxa. (Auth. mod.)

#### B-57093

Zhou, M., Huntley, M.E., **Principle of biological attraction, demonstrated by the bio-continuum theory of zooplankton patch dynamics**, *Journal of marine research*, Sep. 1996, 54(5), p.1017-1037, Refs. p.1035-1037.

A theory of zooplankton and micronekton patch dynamics is developed that expressly includes animal behavior. The "bio-continuum" theory is based on principles of statistical mechanics, and describes animal aggregations in terms of mean motion, random motion, random kinetic energy, distribution and abundance. The authors demonstrate that the internal forces which serve to maintain autocohere are, in essence, a force of biological attraction that can be quantified in Newtons. A coefficient of biological attraction is defined, and its magnitude evaluated in aggregations of antarctic euphausiids (*Euphausia superba*). They hypothesize that the coefficient of biological attraction may be constant for all organisms in the sea. A method for measuring all key variables with acoustic Doppler technology is presented, with specific attention to application of the Acoustic Doppler Current Profiler (ADCP). It is concluded that bio-continuum theory, coupled with acoustic Doppler observations, provides a practical approach for studying animal aggregation dynamics in the sea. (Auth. mod.)

#### B-57098

Freckman, D.W., Virginia, R.A., **Low-diversity antarctic soil nematode communities: distribution and response to disturbance**, *Ecology*, Mar. 1997, 78(2), p.363-369, 44 refs.

This paper examines the distribution, biodiversity, and abundance of nematodes in the most extreme terrestrial environment on earth, the Dry Valley region of Antarctica. The nematode community structure of 1-3 species in two functional groups may be the simplest soil food web of any terrestrial ecosystem. In a field experiment, treatments increasing soil water, carbon, and temperature, alone or in combination, generally decreased the abundance of the single omnivore-predator species and increased the abundance of its microbivorous prey species. These low-diversity nematode communities, limited to  $\leq 3$  species, apparently lack species redundancy and appear sensitive to environmental change. These findings suggest that antarctic soil ecosystems are sensitive to anthropogenic disturbance. (Auth. mod.)

#### B-57099

Letelier, R.M., Abbott, M.R., Karl, D.M., **Chlorophyll natural fluorescence response to upwelling events in the southern ocean**, *Geophysical research letters*, Feb. 15, 1997, 24(4), p.409-412, 31 refs.

Variability of solar-induced (natural) fluorescence and chlorophyll were measured on scales of hours to weeks in the upper layer of a cyclonic eddy located south of the Antarctic Polar Front using a free-floating drifter. The fluorescence signal was analyzed both in terms of chlorophyll concen-

tration and as an indicator of energy distribution in the photosynthetic apparatus. Long-term trends in fluorescence parallel changes in chlorophyll concentration. It is hypothesized that the observed short-term variations in natural fluorescence are a physiological response of phytoplankton to changes in the supply of limiting nutrients. This interpretation is consistent with the southern ocean iron limitation hypothesis. (Auth. mod.)

#### B-57102

Davey, M.C., **Effects of continuous and repeated dehydration on carbon fixation by bryophytes from the maritime Antarctic**, *Oecologia*, Mar. 1997, 110(1), p.25-31, 32 refs.

This paper investigates the effects of medium- and long-term desiccation and repeated dehydration-rehydration cycles on gas exchange by antarctic bryophytes from a range of habitats. The role that desiccation-stress might play in determining the distribution of these plants and the extent to which it may explain the communities observed is considered. (Auth.)

#### B-57103

Gaevskaia, A.V., Podiuk, G.N., Parukhin, A.M., **Peculiarities and formation of parasitofauna of the Patagonian toothfish *Dissostichus eleginoides***, *Soviet journal of marine biology*, July-Aug. 1990 (Pub. May 1991), 16(4), p.195-199, Translated from *Biologiya moria*. 10 refs.

#### DLC QH91.A1B5213 1990

On the Falkland-Patagonian shelf off South Georgia and on the Ob and Lena Banks in the Indian Ocean, 38 species of parasites were found on the toothfish *Dissostichus eleginoides*. Predominant among these species were helminths (36) with a complex life cycle (91.7%). The composition of parasitofauna of toothfish is largely dependent on parasitic fauna of fish from the same habitat. These fauna are richest in the Falkland-Patagonian and South Georgia regions which are the center of the origin and settlement of this fish. The huge similarity of toothfish parasitofauna from different parts of the distribution range, separated by vast expanses and abyssal depths, is evidence for their genetic relationship. This link became possible as the result of the distribution peculiarities of the toothfish which originated in the main flow of the Antarctic Circumpolar Current. (Auth.)

#### B-57104

Slade, R.W., Moritz, C., Heideman, A., Hale, P.T., **Rapid assessment of single-copy nuclear DNA variation in diverse species**, *Molecular ecology*, Dec. 1993, 2(6), p.359-373, Refs. p.371-373.

#### DLC QH541.15.M63M64 1992-93

The authors investigated the use of PCR primers designed to conserve exons within nuclear DNA to amplify potentially variable regions such as introns of hypervariable exons from a wide range of species. They then explored various approaches to assay population-level variation in these PCR products. The sequenced PCR products generally, but not always, confirmed that the correct locus had been amplified. The authors conclude that for studies of population-level variation, the optimal approach is to use a battery of primers for initial PCR of both mtDNA and scnDNA loci, select those that give clean amplifications, and sequence one sample from each population to confirm gene identity, estimate the amount of variation, and search for diagnostic restriction sites. This will allow determination of the most efficient approach for a large-scale study. Some species used in this study were the southern elephant seals (*Mirounga leonina*), leopard seals (*Hydrurga leptonyx*), Weddell seals (*Leptonychotes weddelli*), antarctic fur seals (*Arctocephalus gazella*), and subantarctic fur seals (*A. tropicalis*). (Auth. mod.)

#### B-57105

Maslennikov, V.V., ed, ***Electrona carlsbergi* in the South Polar Frontal zone, Vol.2. Biological aspects of life and distribution. Collected papers** [Elektrona Karlsberga v IUzhnoi Poliarnoi Frontal'noi zone, Tom 2. Biologicheskie aspekty sushchestvovaniia i raspredeleniia. Sbornik nauchnykh trudov], Moscow, Vsesoiuznyi nauchno-issledovatel'skii institut morskogo rybnogo khoziaistva i okeanografii (VNIRO), 1991, 139p., In Russian with English summary. Refs. passim. For selected papers see B-57108 through B-57110, J-57106 and J-57107.

#### DLC SH351.E44E43 1991 Vol.2



This is a collection of papers dealing with *Electrona carlsbergi*'s concentrations, feeding and distribution in waters of the South Polar Frontal zone. Results of hydrobiological and ichthyological investigations carried out in the area in 1987-1990 are discussed.

### B-57108

Podrazhanskaia, S.G., Tarverdieva, M.I., *Electrona calsbergi* **Taning feeding pattern in different areas of the southern ocean** [Sravnitel'naia kharakteristika pitaniia Electrona carlsbergi Taning (Myctophidae) v raznykh raionakh IUzhnogo okeana], Elektrona Karlsberga v IUzhnoi Poliarnoi Frontal'noi zone, Tom 2. Biologicheskie aspekty sushchestvovaniia i raspredeleniia (*Electrona carlsbergi* in the South Polar Frontal zone, Vol.2. Biological aspects of life and distribution). Edited by V.V. Maslennikov, Moscow, Vsesoiuznyi nauchno-issledovatel'skii institut morskogo rybnogo khoziaistva i okeanografii (VNIRO), 1991, p.73-84, In Russian with English summary. 15 refs.

DLC SH351.E44E43 1991 Vol.2

Based on the analysis of stomach content of 1622 specimens of the myctophid *Electrona carlsbergi* descriptions are given of its feeding pattern in different areas of 3 antarctic sectors: hyperiids dominate in the Pacific sector, copepods in the Indian sector and, in the Atlantic sector, the food spectrum is wider. Mean values of the index of fullness fluctuated between 1.4 and 2.8. In Mar. 1990, in the area near South Georgia, two peaks in daily feeding activity were observed, i.e. the main peak at night (11-12), and another during the day (2-3). Two falls in feeding activity in the morning (3-11) and the second half of the day (3-5), were noted. At 1.0°C, and with the mean index of fullness 69.6 per mill, daily food consumption of *E. carlsbergi* equals 1.4% of the body weight. It is found that the food web of myctophids comprises 5 links. *E. carlsbergi* occupies the third trophic level, being a consumer of the third order. (Auth. mod.)

### B-57109

Nevinskii, M.M., Efremenko, V.N., **Ichthyoplankton distribution in the South Polar Frontal zone near South Georgia** [Izuchenie ikhtioplanktona raiona k severu ot ostrova IUzhnaia Georgiia (vidovoi sostav, raspredelenie, chislennost' lichinok)], Elektrona Karlsberga v IUzhnoi Poliarnoi Frontal'noi zone, Tom 2. Biologicheskie aspekty sushchestvovaniia i raspredeleniia (*Electrona carlsbergi* in the South Polar Frontal zone, Vol.2. Biological aspects of life and distribution). Edited by V.V. Maslennikov, Moscow, Vsesoiuznyi nauchno-issledovatel'skii institut morskogo rybnogo khoziaistva i okeanografii (VNIRO), 1991, p.85-101, In Russian with English summary. Refs. p. 99-101.

DLC SH351.E44E43 1991 Vol.2

In Oct.-Nov. 1987, an ichthyoplankton survey was carried out in the area of the South Polar Frontal Zone near South Georgia for species composition, distribution, and larval abundance. Lanternfish, characterized by the notal-antarctic type of the distribution range, predominantly spawned there. Their larvae prevailed in plankton compared with larvae of other species. Data on abundance of the most numerous larvae of *Krefftichthys anderssoni* were used to raise preliminary biomass estimates (fish aged below one year) for the surveyed area (160,000<sup>2</sup>mi). Biomass estimates averaged 36,200 tons. The number of stations necessary to provide representative biomass estimates was 50. (Auth. mod.)

### B-57110

Efremenko, V.N., **Ichthyoplankton studies in southwestern Atlantic, 1989** [Ikhtioplanktonnye issledovaniia v osenne-zimnii sezon 1989 g. v iugo-zapadnoi chasti Atlantiki], Elektrona Karlsberga v IUzhnoi Poliarnoi Frontal'noi zone, Tom 2. Biologicheskie aspekty sushchestvovaniia i raspredeleniia (*Electrona carlsbergi* in the South Polar Frontal zone, Vol.2. Biological aspects of life and distribution). Edited by V.V. Maslennikov, Moscow, Vsesoiuznyi nauchno-issledovatel'skii institut morskogo rybnogo khoziaistva i okeanografii (VNIRO), 1991, p.101-108, In Russian with English summary. 13 refs.

DLC SH351.E44E43 1991 Vol.2

The distribution and species composition of ichthyoplankton were studied between Mar. 20 and Apr. 10, and between May 30 and June 28, 1989, in the area of the South Polar Frontal zone. Fifteen hundred larvae and 60 fingerlings belonging to 25 mesopelagic species (5 families), were identified. The larvae were distributed as follows: the antarctic type of the distribution range, in the zone and to the south of it (3 species); the notal-antarctic type of the distribution, in the zone to the south and to the north of it (5 species); and the notal type of the distribution range, in the zone and to the north of it (17 species). New data were obtained on the larvae of *E. carlsbergi*, an abundant commercial species in the area investigated. The reproduction ground in the distribution range was in the northern part of the notal zone, while the feeding ground was in the area of the South Polar Frontal zone. (Auth. mod.)

### B-57111

Maslennikov, V.V., ed, *Electrona carlsbergi* in the South Polar Frontal zone, Vol.1. **Habitat and distribution. Scouting and research techniques. Problems of raw fish processing. Collected papers** [Elektrona Karlsberga v IUzhnoi Poliarnoi Frontal'noi zone, Tom 1. Usloviia obitaniia i raspredeleniia. Metodika poiska i issledovaniia. Problemy obrabotki syr'ia. Sbornik nauchnykh trudov], Moscow, Vsesoiuznyi nauchno-issledovatel'skii institut morskogo rybnogo khoziaistva i okeanografii (VNIRO), 1990, 190p., In Russian with English summary. Refs. passim. For selected papers see B-57115, B-57119, I-57113, J-57112, J-57114 and J-57116 through J-57118.

DLC SH351.E44E43 1990 Vol.1

This is a collection of papers dealing with *Electrona carlsbergi*'s concentrations and distribution in the waters of the South Polar Frontal zone. Results of oceanologic, hydrochemical, hydroacoustic and technological studies carried out in the area in 1987-1990 are presented. The problems of scouting and catch-processing techniques are discussed.

### B-57115

Mordasova, N.V., Dafner, E.F., Zubarevich, V.L., Mikhailovskii, I.U.A., Selin, P.I.U., Bondarenko, A.I., **Hydrochemical regime of the SPFZ in southwestern Atlantic** [Osobennosti gidrokhimicheskogo rezhima vod v raione IUPFZ IUgo-zapadnoi chasti Atlanticheskogo okeana], Elektrona Karlsberga v IUzhnoi Poliarnoi Frontal'noi zone, Tom 1. Usloviia obitaniia i raspredeleniia. Metodika poiska i issledovaniia. Problemy obrabotki syr'ia (*Electrona carlsbergi* in the South Polar Frontal zone, Vol.1. Habitat and distribution. Scouting and research techniques. Problems of raw fish processing). Edited by V.V. Maslennikov, Moscow, Vsesoiuznyi nauchno-issledovatel'skii institut morskogo rybnogo khoziaistva i okeanografii (VNIRO), 1990, p.90-109, In Russian with English summary. 4 refs.

DLC SH351.E44E43 1990 Vol.1

The article explores results of studies of abiotic factors in the habitat of living organisms in the area of South Polar Frontal Zone (SPFZ) in southwestern Atlantic, the chemical base of primary productivity. Numerous hydrochemical characteristics are examined, including parameters of nitrates, ammonium nitrogen, urea, organic forms of nitrogen, and phosphorus. In spring, summer and autumn (Oct.-Apr.), under the developed seasonal pycnocline and stable stratification of water in the area of SPFZ, phytoplankton develops intensively, especially at the southern boundary where there is a constant inflow of silicon with waters of high latitude modification. Abundance of primary production calculated from the consumption of silicon, which at high gradient fields approached 1 gC/m<sup>2</sup> per day during the vegetation period, and the content of chlorophyll *a* of 3-4 µg/l in the maximum layer, allow one to consider SPFZ as a productive area of the world ocean. (Auth.)

### B-57119

Boklach, G.A., Goncharov, S.M., Dergachev, V.M., Mezentsev, I.G., Poberezhnyi, A.G., **Acoustic investigations of the SPFZ in the antarctic sector of the Atlantic** [Ekhnometricheskie issledovaniia v IUPFZ Atlanticheskogo sektora Antarktiki], Elektrona Karlsberga v IUzhnoi Poliarnoi Frontal'noi zone, Tom 1. Usloviia obitaniia i raspredeleniia. Metodika poiska i issledovaniia. Prob-



lemy obrabotki syr'ia (*Electrona carlsbergi* in the South Polar Frontal zone, Vol. 1. Habitat and distribution. Scouting and research techniques. Problems of raw fish processing). Edited by V.V. Maslennikov, Moscow, Vsesoiuznyi nauchno-issledovatel'skii institut morskogo rybnogo khoziaistva i okeanografii (VNIRO), 1990, p.141-146, In Russian with English summary. 2 refs.

#### DLC SH351.E44E43 1990 Vol.1

Hydroacoustic investigations, carried out in the Atlantic sector of the Antarctic during lanternfish fisheries, are discussed. Results of biomass assessment in different seasons are given. It is noted that summer, and summer-autumn periods, favor acoustic surveys. Fishing operations give best results during summer. A method is suggested for the evaluation of commercial importance of concentrations, and control of the catch accumulation in the trawl during fishing operations, using echo integration through relevant regression equations. (Auth. mod.)

#### B-57130

Catalano, G., Povero, P., Fabiano, M., Benedetti, F., Goffart, A., **Nutrient utilisation and particulate organic matter changes during summer in the upper mixed layer (Ross Sea, Antarctica)**, *Deep-sea research I*, Jan. 1997, 44(1), p.97-112, 53 refs.

The relationships among vertical stability, estimated nutrient utilization and particulate organic matter in the Ross Sea are analyzed from data collected during two cruises in the summers of 1987-88 and 1989-90. In the upper mixed layer (UML), identified through the vertical stability  $E(Z(UML))$ , nutrient consumption is calculated as the difference between the "diluted" nutrient value and the mean calculated from the integrated value in the UML. Significant relationships between nutrient depletion and both particulate organic carbon (POC) and particulate protein/particulate carbohydrate ratios (PPRT/PCHO) are found. The analysis of particulate matter distribution vs nutrient utilization shows that the stations could be divided into two groups having different characteristics. The first group includes coastal stations, where high nutrient utilization, POC and PPRT/PCHO are typical of areas with high production. In the second group (pelagic stations), nutrient utilization, POC and PPRT/PCHO are lower. The vertical stability can be used to discriminate among the factors that influence primary production. (Auth. mod.)

#### B-57133

Pugh, P.J.A., **Acarine colonisation of Antarctica and the islands of the Southern Ocean: the role of zoohoria**, *Polar record*, Apr. 1997, 33(185), p.113-122, Refs. p.119-122.

A quarter of the terrestrial Acari recorded from Antarctica and the subantarctic islands are parasitic haematophages or non-feeding phoretics associated with other larger and more mobile animals, especially sea birds and pterygote insects. Although flying sea birds are effective vectors of zoohorix mites into the region, penguins are not and merely serve as reservoir hosts. Similarly, most of the mites associated with insects were accidentally introduced by man as free-living adults that subsequently utilized a range of alien and indigenous insects as local dispersal mechanisms. (Auth.)

#### B-57138

Prince, P.A., Weimerskirch, H., Huin, N., Rodwell, S., **Molt-maturation of plumage and ageing in the Wandering Albatross**, *Condor*, Feb. 1997, 99(1), p.58-72, 18 refs.

The authors compare the pattern and rate of molt and plumage maturation in wandering albatrosses (*Diomedea exulans chionoptera*) using prebreeding and breeding birds from South Georgia and Crozet Is. Immatures from both sites have a molt cycle which basically alternates molt of outer primaries in one year and inner primaries in the next year. Juvenile wandering albatrosses have most new primaries when 5 year-olds but even at this age some birds have retained primary 1 since they fledged. Males, but not females, from South Georgia replace more primaries than do Crozet birds. Adults breeding for the first time molt fewer primaries than birds breeding 7-11 months after a failed breeding attempt; these adults molt on average 6 primaries. Successful wandering albatrosses, in the 12 months before breeding again, only molt 7-8 primaries on average. Conventional (Gibson) plumage scores do not provide a reliable means of estimating age of wandering albatrosses, except in very general (3-5 year)

categories. The pattern and extent of molt, however, can age most immature birds of *D. e. chionoptera* to within one year; the authors provide a key for doing this. (Auth. mod.)

#### B-57139

Siegel-Causey, D., **Molecular variation and biogeography of Rock Shags**, *Condor*, Feb. 1997, 99(1), p.139-150, Refs. p.149-150.

Molecular analysis of the present genetic structure of Rock Shags indicates significant population subdivision probably caused by vicariant disjunction associated with the Llamquihue Glaciation (35,000-15,000 ybp). The formerly continuous population was forced into refugia on the Pacific and Atlantic coasts, where they remained without contact for approximately 20,000 years. With amelioration of the climate and consequent glacial retreat, populations recolonized rocky shorelines in the central portion of the present day range and introgressed considerably. The Chubút and Falkland populations serve as genetic sources for the others, whereas the Fuegian population acts as a genetic sink. (Auth. mod.)

#### B-57166

Pruthi, V., Cameotra, S.S., **Production and properties of a biosurfactant synthesized by *Arthrobacter protophormiae* - an Antarctic strain**, *World journal of microbiology and biotechnology*, Jan. 1997, 13(1), p.137-139, 12 refs.

This study reports the production of biosurfactant by the antarctic psychrophilic strain *Arthrobacter protophormiae* during growth on an immiscible carbon source, *n*-hexadecane. The biosurfactant reduces the surface tension of the medium from 68.0 mN/m to 30.60 mN/m and exhibits good emulsification activity. The strain could grow and produce biosurfactant in the presence of high NaCl concentrations (10.0 to 100.0 g/l). Although the biosurfactant was isolated by growing the organism under psychrophilic conditions (10°C) it exhibited stable activity over a wide range of temperature (30°C to 100°C). It retained its surface-active properties at pH 2 to 12. The biosurfactant was effective in recovering up to 90% of residual oil from an oil saturated sandpack column, indicating its potential value in enhanced oil recovery. (Auth.)

#### B-57168

Scudiero, R., et al, **Difference in hepatic metallothionein content in Antarctic red-blooded and haemoglobinless fish: undetectable metallothionein levels in haemoglobinless fish is accompanied by accumulation of untranslated metallothionein mRNA**, *Biochemical journal*, Feb. 15, 1997, 322(1), p.207-211, 45 refs.

A striking feature of the icefish is that the liver is devoid of metallothionein. These cysteine-rich heavy-metal-binding proteins are usually present in large amounts in a large variety of organisms, from bacteria to mammals. Despite the failure to detect appreciable levels of metallothionein in icefish liver, a cDNA encoding metallothionein was produced from total RNA by reverse transcriptase PCR. The icefish metallothionein showed high percentage identity with metallothionein from *Trematomus bernacchii*, a red-blooded antarctic fish in which a normal content of hepatic metallothionein was found. Steady-state mRNA levels were assessed in fish liver by high-stringency hybridization of the metallothionein probe with total RNA. The results showed that icefish livers retain large amounts of untranslated metallothionein mRNA. The stability of the icefish transcript might be correlated with the lack of specific motifs in the untranslated 3' ends of mRNA. (Auth. mod.)

#### B-57169

Donato, A., Valenti, G., **On a possible model to explain phytoplankton blooms produced by a receding ice edge**, *International journal of non-linear mechanics*, May 1997, 32(3), p.465-470, 6 refs.

This paper presents a mathematical model to describe the interaction of ice-ocean-plankton in the southern ocean, based on a similar model used for blooms in the estuaries. The model obtained is hyperbolic and wave phenomena may be studied. Travelling wave solutions are related to the formations of blooms. (Auth.)



**B-57189**

Van Leeuwe, M.A., Scharek, R., De Baar, H.J.W., De Jong, J.T.M., Goeyens, L., **Iron enrichment experiments in the Southern Ocean: physiological responses of plankton communities**, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.189-207, Refs. p.204-207.

The physiological responses of plankton to iron enrichment were investigated in experiments performed in 20-l culture vessels. Natural phytoplankton communities in sea water, with mean ambient Fe concentrations ranging from 0.3-0.4 nM in the Antarctic Circumpolar Current to 1.2-1.9 nM in the Polar Frontal region, were incubated for several days. Upon addition of 2 nM of iron, synthesis of chlorophyll *a* and nutrient uptake was stimulated. The specific nitrate-uptake rates as determined by <sup>15</sup>N-uptake experiments consistently increased, as well as the ratios of chlorophyll *a* to particulate carbon. Growth rates in iron-enriched bottles were consequently enhanced relative to control bottles. The biochemical composition of the plankton community, indicated by carbon to nitrogen ratios and fatty acid composition, remained unaffected by iron addition. On the basis of <sup>14</sup>C incorporation into the major biochemical pools, no changes were observed in the allocation of carbon into proteins, polysaccharides, lipids and low-molecular-weight metabolites in the particulate fraction. Antarctic phytoplankton endures the low ambient iron concentrations by maintaining physiological processes at lower activity rates, whereas the biochemical composition of the plankton remains virtually unaffected. (Auth.)

**B-57190**

Scharek, R., Van Leeuwe, M.A., De Baar, H.J.W., **Responses of Southern Ocean phytoplankton to the addition of trace metals**, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.209-227, Refs. p.225-227.

Trace metal enrichment experiments were performed under ultraclean conditions with natural oceanic plankton populations, in Oct.-Nov. 1992, beginning and again later in the middle of a bloom, from the Antarctic Circumpolar Current south of the Front, from the sea-ice edge area and from the ice-covered northern Weddell Sea. Overall, rates of chlorophyll *a* increased and final yields increased, relative to the controls, by about 10% to more than 50%. Additions of 5 and 10 nM Fe yielded about 10% higher specific growth rates than additions of 2 nM. Combining Fe with one or more of the other trace metals did not result in significantly higher yields or growth rates as with Fe alone, even at high initial biomass. It is concluded that in the southern ocean biomass build-up by phytoplankton is limited by decreasing availability of trace metals, notably Fe, under conditions of sufficient light and low grazing pressure. (Auth. mod.)

**B-57192**

Peeken, I., **Photosynthetic pigment fingerprints as indicators of phytoplankton biomass and development in different water masses of the Southern Ocean during austral spring**, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.261-282, Refs. p.279-282.

The development of phytoplankton biomass and composition was investigated on three occasions, along a longitudinal transect (6°W) between 60°S and 47°S, from Oct. 13 to Nov. 21, 1992 by measurement of photosynthetic pigments with high performance liquid chromatography (HPLC). Phytoplankton blooms developed in the Polar Frontal region (PFR) and were dominated (80%) by diatoms. Other groups contributing to the phytoplankton included prymnesiophytes, green algae, autotrophic dinoflagellates, cryptophytes, pelagophytes and micromonadophytes, and their distributions varied with time. In contrast, phytoplankton biomass remained low in the southern Antarctic Circumpolar Current (ACC) and was dominated by flagellates, particularly green algae and prymnesiophytes. Only a slight increase in phytoplankton biomass, composed primarily of diatoms, was found at the ACC-Weddell Gyre front. Cluster analysis revealed that different phytoplankton communities characterized the different water masses of the PFR and southern ACC; the history of different water masses in the PFR could be reconstructed on this basis. (Auth. mod.)

**B-57194**

Detmer, A.E., Bathmann, U.V., **Distribution patterns of autotrophic pico- and nanoplankton and their relative contribution to algal biomass during spring in the Atlantic sector of**

**the Southern Ocean**, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.299-320, Refs. p.317-320.

Flow cytometry and epifluorescence microscopy were employed to determine the abundance, distribution and size structure of autotrophic pico- and nanoplankton between the Polar Front and the receding ice-edge during Oct. 12-Nov. 21, 1992. Abundances ranged from <1.0 to >20.0 x 10<sup>6</sup> cells/l in the upper 100 m layer. Lowest surface concentrations were found at the receding ice-edge. Abundances increased with advancing season within the Polar Front region and in the southern Antarctic Circumpolar Current zone (ACC) but not south of the ACC-Weddell Gyre Boundary. Autotrophic pico- and nanoplankton contributed up to 90% to total chlorophyll *a* in regions with low chlorophyll *a* concentrations but less than 50% in regions where phytoplankton biomass accumulated. Regional variability in magnitude of the spring bloom is due to diatoms while the standing stock of autotrophic pico- and nanoplankton is less variable. The authors hypothesize that neither micronutrients nor grazing suppresses abundance of pico- and nanophytoplankton below a "background" concentration of about 2.0-4.0 x 10<sup>6</sup> cells/l during spring and early summer in wide areas of the southern ocean. Their observations confirm the hypothesis that both groups represent abundant and stable constituents of the phytoplankton assemblage in the southern ocean. (Auth. mod.)

**B-57195**

Lochte, K., Bjørnsen, P.K., Giesenhausen, H., Weber, A., **Bacterial standing stock and production and their relation to phytoplankton in the Southern Ocean**, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.321-340, Refs. p.338-340.

In the Atlantic sector of the southern ocean bacterial numbers, biomass and production were measured in the upper 200 m of the water column Oct.-Nov. 1992, from the Polar Front region (PFR), across the southern part of the Antarctic Circumpolar Current (ACC) to the retreating Marginal Ice Zone (MIZ). During this austral spring period, bacterial standing stock and production were highest and showed a gradual increase in the PFR where a phytoplankton bloom started to develop. No indication of elevated bacterial parameters were detected at the MIZ. Bacterial numbers and chlorophyll *a* as well as bacterial and primary production were highly positively correlated and were similar to the relationships found in other oceanic regions. Bacterial production amounted to 12-22% of primary production on average, and the turnover time of bacterial biomass was 5-70 days. (Auth. mod.)

**B-57197**

Becquevort, S., **Nanoprotozooplankton in the Atlantic sector of the Southern Ocean during early spring: biomass and feeding activities**, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.355-373, Refs. p.371-373.

The dynamic of early spring nanoprotozoa was investigated in 3 characteristic water masses of the southern ocean: the Marginal Ice Zone, the intermediate waters of the Antarctic Circumpolar Current and the Polar Frontal Zone. Biomass and feeding activities of nanoprotozoa were measured, as well as the biomass of their potential prey—bacteria and phototrophic flagellates. On average, nanoprotozooplankton biomass accounted for 77% of the combined biomass of bacteria and phototrophic flagellates, and was dominated by dinoflagellates and flagellates smaller than 5 µm. As a general trend, low protozoan biomass of 2 mg C/m<sup>3</sup> was typical of the ice covered area, while significantly higher biomasses culminating at 15 mg C/m<sup>3</sup> were recorded at the Polar Front. Biomasses of bacteria and total phytoplankton were distributed accordingly, with larger values at the Polar Front. A strong ability of dinoflagellates for feeding on nanophytoplankton was noted. Daily ingestion rates were calculated from nanoprotozoan grazing parameters and carbon biomass of prey and predators. This indicated that nanoprotozoa ingestion of daily bacterioplankton and phytoplankton production in early spring ranged from 32 to 40%. (Auth. mod.)

**B-57198**

Klaas, C., **Microprotozooplankton distribution and their potential grazing impact in the Antarctic Circumpolar Current**, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.375-393, Refs. p.390-393.



The abundance and composition of microphyto- and microprotozooplankton were studied in late Oct. 1992 along the southern Antarctic Circumpolar Current (ACC) and the Polar Front region (PFR). Microphytoplankton standing stocks were low in the ACC, but attained bloom proportions in the PFR, where diatoms dominated. Microprotozooplankton standing stocks varied from 197 to 434 mgC/m<sup>2</sup> in the ACC and 282 to 665 mgC/m<sup>2</sup> in the PFR. The composition of the ciliate community and the size structure of microprotozooplankton assemblages differed significantly between the ACC and the PFR, whereas there was no significant difference between the ice edge and the open ACC water. Grazing by microprotozooplankton ranged from 11 to 54% and 4 to 56% of primary production in the southern ACC and PFR, respectively. The grazing estimates and the importance of large protozoa (>40 µm) in the ACC suggest that they can play a significant role in controlling blooms of diatoms. Further, factors other than food supply seem to determine both the size structure and composition of microprotozooplankton assemblages. (Auth. mod.)

### B-57199

Fransz, H.G., Gonzalez, S.R., **Latitudinal metazoan plankton zones in the Antarctic Circumpolar Current along 6°W during austral spring 1992**, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.395-414, Refs. p.412-414.

Mesozooplankton and smaller metazoans were sampled from 5 depth layers between 0 and 500 m, and daily egg production was measured in copepods; latitudinal and vertical abundance, biomass and species distribution were recorded twice along the 6°W meridian between the Weddell Gyre and the Polar Frontal Zone in Oct. and Nov. 1992. Carbon weight-length relationships are presented for the dominant copepod species *Calanoides acutus*, *Rhincalanus gigas*, *Metridia gerlachei* and *Oithona similis*. Antarctic calanoid copepods as a group dominated biomass in both regions, but the cyclopoid copepod *O. similis* had the highest numerical abundance and in general also the highest biomass of all species. Mean copepodid abundance below 100 m was not different in the PFR and the AZ indicated that accumulation in the Antarctic Convergence or a difference in timing of the spring rise to the surface was not the main cause of the latitudinal spring peak in the PFR. (Auth. mod.)

### B-57200

Dubischar, C.D., Bathmann, U.V., **Grazing impact of copepods and salps on phytoplankton in the Atlantic sector of the Southern Ocean**, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.415-433, Refs. p.430-433.

During the *Polarstern* cruise in Oct./Nov. 1992, grazing of the dominant calanoid copepods (*Calanoides acutus*, *Calanus propinquus* and *Rhincalanus gigas*) and of *Salpa thompsoni* was determined. *C. acutus* and *R. gigas* were very abundant in the Polar Frontal region (PFR). *C. propinquus* was abundant at the ACC-Weddell Gyre Boundary (AWB). Grazing by copepods was very low and accounted for less than 1% of the primary production (PP) for all three species. *S. thompsoni* occurred in swarms in the southern part of the Antarctic Circumpolar Current (ACC) where its ingestion rates accounted for more than 100% of the PP. It is concluded that grazing by copepods had a negligible effect on build-up of the phytoplankton biomass recorded in the PFR and—to a much lesser extent—at the AWB, whereas high grazing pressure of *S. thompsoni* was likely to have constrained phytoplankton biomass levels in the ACC. (Auth.)

### B-57201

Van Franeker, J.A., Bathmann, U.V., Mathot, S., **Carbon fluxes to Antarctic top predators**, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.435-455, Refs. p.453-455.

The role of birds, seals and whales in the overall biological carbon fluxes of the southern ocean has been estimated based on census counts of top predator individuals in the region. Using standard routines for conversion to food consumption and respiration rates the authors demonstrate that at most 0.3-0.6% of primary production in the southern ocean is exhaled, even if primary production by ice-algae is ignored. Food requirements of top predators indicate that photosynthetic production in the ice biota likely is substantial, deserving future attention and research. The results of these field observations deviate strongly from much higher top-

predator respiration of 2-22.5% of primary production, as recently suggested from theoretical models. The findings illustrate that the antarctic food web is more complex than hitherto acknowledged. (Auth.)

### B-57213

Gorny, M., George, M.R., **Oocyte development and gonad production of *Nematocarcinus lanceopes* (Decapoda: Caridea) in the eastern Weddell Sea, Antarctica**, *Polar biology*, Mar. 1997, 17(3), p.191-198, Refs. p.197-198.

*Nematocarcinus lanceopes* Bate 1888 is the only decapod that occurs in large numbers on the continental slope of the Weddell Sea. Histological examination of the female gonads and analyses of oocyte growth indicate a biannual reproduction cycle with seasonal oocyte maturation in this species. Vitellogenic development is estimated to take 2 years and culminates during summer. Females spawn 3 times, every 2nd year, while they grow from 27 to 34 mm carapace length. Based on these results, the calculated female gonad production is 184 g wet mass (70.5 g dry mass)/total catch. Seasonal reproductive patterns of *N. lanceopes* seem to reflect oscillating food conditions in the Weddell Sea. This mode of reproduction differs from all other Nematocarcinidae, which release eggs the whole year round. The ability to adapt the reproductive cycle to a seasonal productivity pattern may have been an important factor in extending the distribution range of the deep-water genus *Nematocarcinus* into antarctic waters. (Auth.)

### B-57214

Gambi, M.C., Castelli, A., Guizzardi, M., **Polychaete populations of the shallow soft bottoms off Terra Nova Bay (Ross Sea, Antarctica): distribution, diversity and biomass**, *Polar biology*, Mar. 1997, 17(3), p.199-210, Refs. p.209-210.

A total of 5,768 individuals of polychaetes, belonging to 77 species, were collected in the Ross Sea in the austral summer 1989-1990. Despite the high number of species found, only a few species accounted for 76% of the total abundance: *Tharyx cincinnatus* (27%), *Spiophanes tcherniai* (23%), *Leitoscoloplos mawsoni* (18%) and *Laonice weddellia* (5%). Species, richness, diversity and evenness showed an increase with depth. Abundances ranged between 40 to over 12,000 ind/m<sup>2</sup>. Biomass values ranged between 0.9 to 176 g/m<sup>2</sup> (wet weight). The richest and most diverse assemblages of polychaetes were those occurring below 140 m depth, where the substrate was dominated by medium sands, often mixed with a mosaic of rocks and boulders. (Auth. mod.)

### B-57215

Lowe, T.E., Wells, R.M.G., **Exercise challenge in Antarctic fishes: do haematology and muscle metabolite levels limit swimming performance?**, *Polar biology*, Mar. 1997, 17(3), p.211-218, Refs. p.217-218.

Burst swimming increased haematocrit (partly from erythrocyte swelling) in the cryopelagic nototheniid *Pagothenia borchgrevinki*, but not in the benthic species *Trematomus bernacchii*. Erythrocyte nucleotides, which regulate haemoglobin-oxygen affinity, remained constant. Plasma cortisol was high in all captive fish and raised questions about the effects of chronic stress on metabolic measurements from antarctic fish held in captivity. Glycogen was reduced in white trunk muscle, but not in the red pectoral muscle of exercised *P. borchgrevinki*. Red pectoral muscle glycogen was nearly 3 times higher in *T. bernacchii* than in *P. borchgrevinki* but post-exercise lactate rises were modest. Lactate values were, however, higher in exercised *P. borchgrevinki* white muscle than in *T. bernacchii*, and correlated with muscle-buffering capacity. Resting adenylate energy charge (AEC) was unexpectedly low in both species and reduced with exercise only for white muscle in *P. borchgrevinki*. While it appears that the capacity for burst swimming is limited by endogenous metabolic fuels, confirmation of low resting values of ATP and AEC in antarctic fishes requires the development of methods that maintain high phosphocreatine levels in the muscle. (Auth.)

### B-57216

Davey, M.C., **Effects of physical factors on photosynthesis by the Antarctic liverwort *Marchantia berteroana***, *Polar biology*, Mar. 1997, 17(3), p.219-227, Refs. p.226-227.



Effects of irradiance, temperature and water availability on respiration and photosynthesis in a maritime antarctic liverwort, *Marchantia berteroana*, were investigated. The relationships between respiration, photosynthesis, irradiance and temperature were modelled. Application of these models to year-round micro-climate data provided an estimate of yearly net productivity of 823 (SE=75) mg C/g ash-free dry weight/year; this is somewhat higher than figures obtained for other antarctic cryptogams. Desiccation had a highly adverse affect on *Marchantia*. Photosynthetic capacity was reduced below a water content of 12 g/g afdw, and there was only a limited recovery (ca. 10%) after dehydration. Freezing also caused a great reduction in photosynthesis, although the model suggested that photosynthesis at sub-zero temperatures is likely. It is suggested that seasonality in the photosynthetic capacity and the survival of sub-zero temperatures might be important. It is concluded that *Marchantia* is a relatively productive antarctic cryptogam that may dominate favorable areas, but that its low tolerance of environmental stress, particularly desiccation, limits its distribution to relatively mild habitats. (Auth.)

#### B-57217

Meyer, W.R., Bengtson, J.L., Jansen, J.K., Russell, R.W., **Relationships between brood size and parental provisioning performance in chinstrap penguins during the chick guard phase**, *Polar biology*, Mar. 1997, 17(3), p.228-234, Refs. p.233-234.

The authors studied patterns of adult chinstrap penguins' foraging-trip duration and frequency, food load delivery, and chick growth rates in relation to brood size, during the guard phase in 4 breeding seasons (1991-1994) on Seal I. Parents with two chicks made more frequent foraging trips to sea; the duration of foraging trips was unrelated to brood size. Overall, parents with two chicks spent ca. 15% more time at sea than parents with only one chick. Both the frequency and duration of foraging trips varied between years. Chick growth rate varied between years, but was related to brood size only in 1992, when chicks from two-chick broods grew significantly more slowly than chicks from one-chick broods. Food loads transported to chicks, as well as chick growth rates, were highest in 1994, when concurrent hydroacoustic studies indicated that regional krill biomass was severely depressed. (Auth. mod.)

#### B-57218

Regoli, F., Principato, G.B., Bertoli, E., Nigro, M., Orlando, E., **Biochemical characterization of the antioxidant system in the scallop *Adamussium colbecki*, a sentinel organism for monitoring the Antarctic environment**, *Polar biology*, Mar. 1997, 17(3), p.251-258, Refs. p.257-258.

The scallop *Adamussium colbecki* can be profitably used for monitoring antarctic coastal environments but its utility would be increased if chemical analyses of pollutants were integrated with data on their biological effects. Since oxidative stress is a common pathway of toxicity induced by xenobiotics, a preliminary biochemical characterization was carried out on the antioxidant system of this species. The digestive gland and gills were investigated for levels of glutathione and the activity of several glutathione-dependent and antioxidant enzymes. The same enzymatic activities were measured for comparison in the Mediterranean molluscs *Mytilus gallorprovincialis* and *Pecten jacobaeus*. Catalase activity, much higher in *A. colbecki* than in the Mediterranean molluscs, may represent a biochemical adaptation to the antarctic marine environment with high levels of dissolved oxygen. (Auth. mod.)

#### B-57219

Fenice, M., Selbmann, L., Zucconi, L., Onofri, S., **Production of extracellular enzymes by Antarctic fungal strains**, *Polar biology*, Mar. 1997, 17(3), p.275-280, Refs. p.279-280.

Thirty-three fungal strains, isolated from different sites on Victoria Land were plate-screened for their ability to produce 12 extracellular enzymes. Lipases were generally present and in high quantities in almost all the strains. Polygalacturonase, as well as amylase and phosphatase, was common. Glucose oxidase, protease and DNAase appeared to be generally low or absent. Many strains, producing a limited number of enzymes, appeared to have a low eco-nutritional versatility while a few, such as *Verticillium* cfr. *Lecanii* no.1, *V. cfr. lecanii* no.3, *Aspergillus versicolor* and *Phoma* sp. no.2, showing a diversified enzymatic competence, are probably advantaged in extreme terrestrial environments characterized by low competition. The possibility of utilizing the enzyme-producing ability of these fungi in applied research is also discussed. (Auth.)

#### B-57220

Laturnus, F., Adams, F.C., Gómez, I., Mehrtens, G., **Halogenating activities detected in Antarctic macroalgae**, *Polar biology*, Mar. 1997, 17(3), p.281-284, 30 refs.

Halogenating activities were determined in samples of 18 cultivated species of brown, red and green macroalgae from the Antarctic. Activities for the halogenating organic compounds with bromide, iodide and chloride were found. Investigated red algae (rhodophytes) showed higher brominating and iodinating activities compared to brown (phaeophytes) and green (chlorophytes) algae. The highest brominating and iodinating activities were measured in the red algae *Plocamium cartilagineum* (1.11 U/g wet algal weight and 0.18 U/g wet algal weight, respectively) and *Myriogramme mangini* (3.62 U/g wet algal weight and 4.5 U/g wet algal weight, respectively). Chlorinating activities were detected in the red alga *P. cartilagineum* only (0.086 U/g wet algal weight). (Auth.)

#### B-57223

Robinson, D.H., Kolber, Z., Sullivan, C.W., **Photophysiology and photoacclimation in surface sea ice algae from McMurdo Sound, Antarctica**, *Marine ecology progress series*, Feb. 27, 1997, 147(1-3), p.243-256, 59 refs.

This study investigates the photophysiology of surface pond communities associated with the fast ice in McMurdo Sound. Photosynthesis-irradiance characteristics, pigmentation, absorption characteristics and the efficiency of energy conversion at photosystem II (PSII) were examined for natural algal populations freshly collected from the field and those subjected to laboratory incubations under controlled light conditions. Results indicate that surface ice algae employ mechanisms to dissipate excess excitation energy and that they have a high level of tolerance to photoinhibitory damage. These characteristics, however, offer only a limited acclimation to the high irradiance of the surface ice habitat. (Auth. mod.)

#### B-57224

San Martín, G., Parapar, J., **"Errant" polychaetes of the Livingston Island shelf (South Shetlands, Antarctica), with the description of a new species**, *Polar biology*, Apr. 1997, 17(4), p.285-295, Refs. p.294-295.

The Spanish cruise "Bentart 94" carried out a study of the benthic marine fauna off Livingston and Deception islands. In this paper, the taxonomic results of the examination of the "errant" families of the polychaetes collected during the cruise are presented. A total of 834 specimens have been examined, belonging to 34 species of 31 genera and 11 families. A new species, *Micronereis anaramosae*, is described, and *Eusyllis kerguelensis* McIntosh is referred to the genus *Pionosyllis*. The specimens were found in 109 samples of muddy sand, mud, stones, rocks, gravel, and mixed sediments, by scuba diving, Van Veen grab, rock trawl and anchor dredge. (Auth.)

#### B-57225

Watanuki, Y., Kato, A., Naito, Y., Robertson, G., Robinson, S., **Diving and foraging behaviour of Adélie penguins in areas with and without fast sea-ice**, *Polar biology*, Apr. 1997, 17(4), p.296-304, Refs. p.303-304.

The diving and foraging behaviors of Adélie penguins, *Pygoscelis adeliae*, rearing chicks at Fukuro Cove, where the fast ice remained throughout summer, were compared to those of penguins at Magnetic I., where the fast ice disappeared in early Jan. Parent penguins at Fukuro Cove made shallower but longer dives than those at Magnetic I. Dive duration correlated with dive depth at both colonies. Parents at Fukuro Cove made shorter foraging trips, with proportionally longer walking/swimming, and returned with smaller meals than those at Magnetic I. Trip duration at both colonies correlated to the total time spent diving. Trip duration at Fukuro Cove, increased as walking/swimming travel time increased. It is concluded that these differences in foraging behavior between colonies reflected differences in the availability of foraging sites. (Auth. mod.)

#### B-57226

Piepenburg, D., Voß, J., Gutt, J., **Assemblages of sea stars (Echinodermata: Asteroidea) and brittle stars (Echinodermata: Ophiuroidea) in the Weddell Sea (Antarctica) and off North-east Greenland (Arctic): a comparison of diversity and abun-**



**dance, *Polar biology*, Apr. 1997, 17(4), p.305-322, Refs. p.320-322.**

Composition and distribution of asteroid and ophiuroid assemblages were investigated by means of Agassiz trawl catches at 34 stations in 220- to 1,200-m depth in the Weddell Sea and at 17 stations in 90- and 830-m depth off Greenland. A total of 86 species (48 sea stars, 38 brittle stars) were identified in the Weddell Sea; in Greenland, a total of 26 species were recorded. In both study areas, brittle stars were numerically more important than sea stars, and abundances generally decreased with water depths. Mass occurrences of brittle stars, such as those recorded on Greenlandic shelf banks, have not been discovered in the Weddell Sea. *Ophioplocus incipiens*, *Ophiurolepis martensi* and *O. brevissima* were the most prominent species on the eastern shelf, *Ophiacantha antarctica*, *O. gelida* and *Ophionotus victoriae* on the southern shelf, and *Ophioparte gigas*, as well as the asteroid *Hymenaster* sp., in the shelf trenches. Overall, the Weddell Sea housed conspicuously more asterozoan species than the waters off Greenland. (Auth. mod.)

#### B-57227

Wilson, R.P., Bost, C.A., Pütz, K., Charrassin, J.B., Culik, B.M., Adelung, D., **Southern rockhopper penguin *Eudyptes chrysocome chrysocome* foraging at Possession Island, *Polar biology*, Apr. 1997, 17(4), p.323-329, Refs. p.328-329.**

The foraging ecology of rockhopper penguins was studied at Possession I., southern Indian Ocean, by counting the number of birds departing from and arriving at colonies over the course of the day and by equipping three birds with time/depth loggers, one of which was recovered having recorded a total of 12 days foraging activity. Both the counts and the results from the diving behavior showed that the birds foraged exclusively diurnally. Maximum dive depth was 66 m, although most time was spent between 10 and 25 m, depths that did not accord with the published distribution of their principal prey as detected by nets and acoustics. (Auth.)

#### B-57228

Opaliński, K.W., Maciejewska, K., Georgieva, L.V., **Notes on food selection in the Antarctic krill, *Euphausia superba*, *Polar biology*, Apr. 1997, 17(4), p.350-357, Refs. p.355-357.**

Analysis of the gut contents of *Euphausia superba* and of the phytoplankton composition in the area of the animals catchment served as a basis for answering the question whether or not *E. superba* is capable of food selection. It was found that the diatom *Thalassiosira* is preferred by *E. superba* as a food item and small pennate diatoms, *Nitzschia*, and *Navicula* are only tolerated as food. Other algae taxa, such as *Tropidoneis*, *Dactyliosolen*, *Chaetoceros*, and *Gyrodinium*, are clearly avoided. With respect to phytoplankton cell size, *E. superba* prefers cells with a length of 20-40 µm and cells larger than 70 µm are rejected. Trophic conditions only slightly affect the food selection of *E. superba*. (Auth.)

#### B-57229

Masini, M.A., Sturla, M., Uva, B., **Key enzymes of the kallikrein-kinin system in Antarctic teleosts, *Polar biology*, Apr. 1997, 17(4), p.358-362, 18 refs.**

Some of the mammalian kallikrein-kinin system (KKS)-like components were identified in two species of antarctic notothenioids [*Chionodraco hamatus* (Channichthyidae) and *Trematomus bernacchii* (Nototheniidae)]. The kidney and heart were tested for kallikrein-like activity. Values, expressed as nmol p-nitroanilide/mg proteins, were in *C. hamatus* 15.5±1.5 and 15.2±1.4 in kidney and heart, respectively, and 15.8±2.2 and 15.9±1 in kidney and heart of *T. bernacchii*. Kininase II-like activity was performed on kidney, gills and heart using the substrate hippuryl-L-histidyl-L-leucine. The activity was inhibited by captopril, and in kidney and gills by high temperatures (20°C and 37°C); in the heart the enzymatic activity was measurable also at 20°C. Bradykinin-like immunoreactive cells were localized by immunohistochemistry in the nephron, in the gills, and in the arterial walls of the heart. These results show that antarctic teleosts possess elements comparable to those of the KKS, including kallikrein-like, and kininase II-like activities, and the end product of the enzymatic cascade, bradykinin. The enzymatic cascade appears to be fully active only at low temperatures. (Auth. mod.)

#### B-57230

Zampi, M., Benocci, S., Focardi, S., **Epibiont foraminifera of**

***Sertella frigida* (Waters) (Bryozoa, Cheilostomata) from Terra Nova Bay, Ross Sea, Antarctica, *Polar biology*, Apr. 1997, 17(4), p.363-370, Refs. p.369-370.**

Several arenaceous and calcareous foraminifera epibionts of *Sertella frigida* collected in Terra Nova Bay in 1989-90, were studied. Arenaceous species are a conspicuous component of the epifaunal community. The calcareous foraminifers encrusting *S. frigida* are mostly represented by *Cibicides refulgens* and *Rosalina globularis*. Foraminifera were found only in the basal part of the bryozoan colonies. The presence of many juveniles provided evidence that foraminifers were reproducing at the time of sampling. *Psammosphaera fusca* f. *adhaerescens* was found exclusively inside the zooids of *S. frigida*. The large number of individuals associated with the bryozoan suggest that *P. fusca* f. *adhaerescens* finds optimum conditions (shelter, food, and grains for shell building) for growth inside the zooids of *S. frigida*. The other species occurred most commonly adhered to the trabeculae or to the zooid orifices of *S. frigida*. An elevated position offers a better chance to catch food particles from the overlying water column. Foraminifers could benefit also from bryozoan feeding currents. (Auth.)

#### B-57231

Woehler, E.J., **Seabird abundance, biomass and prey consumption within Prydz Bay, Antarctica, 1980/1981-1992/1993, *Polar biology*, Apr. 1997, 17(4), p.371-383, Refs. p.382-383.**

Annual observations of seabirds within Prydz Bay, between the 1980-81 and 1992-93 seasons, revealed significant changes in abundance of the 9 resident and 15 non-resident species. An estimated 4.85 million individual residents and 2.35 million individual non-residents were present each season. For resident and non-resident species, mean abundance was 3.75 and 1.81 birds/km<sup>2</sup>, and mean biomass was 6.67 and 1.70 kg/km<sup>2</sup>, respectively. Based on estimated abundances, the total consumption of marine resources by the seabird community within Prydz Bay ranged from 471,000 to 1.1 million tons per 6-month summer, or between 2.02 and 4.53 kg/km<sup>2</sup> per day. The mean energy flux to the seabird community within Prydz Bay each summer was 3.13 x 10<sup>12</sup> kJ, of which 66% went to the resident species. Regional abundance and biomass estimates for resident and non-resident species were both negatively correlated; when the estimated abundance and biomass of resident species were high, those of non-resident species were low. (Auth. mod.)

#### B-57232

Mascetti, P., Fernandez de la Reguera, R., Albornoz, L., Oyarzún, S., Gorny, M., Wehrtmann, I., **Gonopore development and sex change in the Antarctic shrimp *Chorismus antarcticus* (Caridea: Hippolytidae), *Polar biology*, Apr. 1997, 17(4), p.384-388, 18 refs.**

*Chorismus antarcticus* is the only protandrous hermaphrodite decapod species found on the antarctic continental shelves. The morphological structures of the male and female gonopores were described and used to determine sex and to fix the size range at which the transition from male to female takes place. The parallel occurrence of male and female gonopores was found in all specimens. The presence of open gonopore flaps at both the third and fifth pair of pereopods in individuals between 9 and 12 mm of carapace length (CL) is discussed as the morphological indicator of sex change. Few females occurred from 9 mm CL onwards, whereas all shrimps larger than 13 mm CL only had open female gonopores. This size corresponds exactly with the CL at which onset of oocyte development and female gonad production starts. Secondary sexual characters, the gonopore structures, seem to allow an accurate prediction of the size range at which hermaphrodite caridean decapods change sex. (Auth.)

#### B-57233

Sáiz-Salinas, J.I., et al, **Quantitative analysis of macrobenthic soft-bottom assemblages in South Shetland waters (Antarctica), *Polar biology*, Apr. 1997, 17(4), p.393-400, Refs. p.399-400.**

Macrobenthic assemblages were investigated at 26 stations located around Livingston and Deception islands and the Bransfield Strait at depths ranging from 42 to 671 m. Representatives of 30 major taxa were found. The maximal density was 5,260 specimens/m<sup>2</sup> at Livingston I.; the mean abundance per station ranged from 160 to 4,380 specimens/m<sup>2</sup>. The total biomass of the macrozoobenthos declined with depth. After multi-



variate analysis (cluster analysis, MDS) based on Bray-Curtis dissimilarities, most stations could be assigned to one of 3 groups on the basis of distinct biomass differences between sites: a rich Ascidiacea biomass is common on shallower bottoms; the Ophiuroidea is common on deeper bottoms. The absence of an 'indicator' taxon is characteristic of the remaining cluster of those stations with the lowest biomass values. No significant correlations were detected between macrobenthic biomass and any sediment parameters measured, probably because part of the benthos could be better explained by the coupling with a highly productive water column. (Auth. mod.)

#### B-57246

Schumann, P., Prauser, H., Rainey, F.A., Stackebrandt, E., Hirsch, P., ***Friedmanniella antarctica* gen. nov., sp. nov., an LL-diaminopimelic acid-containing actinomycete from antarctic sandstone**, *International journal of systematic bacteriology*, Apr. 1997, 47(2), p.278-283, 49 refs.

A gram-positive, aerobic, slowly growing actinomycete was isolated from antarctic sandstone. Packets of spherical cells of this organism form clusters. The diagnostic diamino acid of the peptidoglycan is LL-diaminopimelic acid with glycine in position 1 of the peptide subunit. The major menaquinone is MK-9(H<sub>4</sub>), and the main cellular fatty acids are 12- and 13-methyltetradecanoic acids. Only a few organic compounds are metabolized. The DNA base composition is 73 mol% G+C. A 16S ribosomal DNA sequence comparison showed that this isolate is a phylogenetic neighbor of the propionibacteria and related taxa. Its closest relative is *Microtholunatus phosphovorus*. Morphological, physiological, and genotypic characteristics support the description of a new genus and new species, *Friedmanniella antarctica* gen. nov., sp. nov. The type strain is strain AA-1042 (=DSM 11053). (Auth.)

#### B-57247

Bozal, N., Tudela, E., Rosselló-Mora, R., Lalucat, J., Guinea, J., ***Pseudoalteromonas antarctica* sp. nov., isolated from an Antarctic coastal environment**, *International journal of systematic bacteriology*, Apr. 1997, 47(2), p.345-351, 48 refs.

The taxonomic characteristics of 5 bacterial strains which were isolated from coastal marine environments were studied. These bacteria were psychrotrophic, aerobic, and gram negative with polar flagella. The G+C contents of the DNAs of these strains were 41 to 42 mol%. The antarctic strains were phenotypically distinct from the previously described *Pseudoalteromonas* type species. DNA-DNA hybridization experiments revealed that the new strains were closely related to each other but clearly different from *Pseudoalteromonas haloplanktis* and *Pseudoalteromonas atlantica*, which were the most phenotypically similar organisms. None of the bacterial isolates was capable of using DL-malate, D-sorbitol, or *m*-hydroxybenzionate, and all were capable of gelatin hydrolysis. Strains NF2, NF3<sup>T</sup> (T=type strains), NF13, NF14, and EN10 and an Na<sup>+</sup> requirement but required only 17 mM Na<sup>+</sup>. Phenotypic, DNA G+C content, DNA-DNA hybridization, 16S rRNA analysis, fatty acid composition, and protein profile data confirmed the identification of the antarctic strains as members of a *Pseudoalteromonas* sp. The name *P. antarctica* sp. nov. is proposed for these organisms. (Auth.)

#### B-57249

Cueto, M., Darias, J., **New acetyl derivatives from antarctic *Delisea fimbriata***, *Journal of natural products*, Mar. 1997, 60(3), p.279-281, 17 refs.

Compounds with three characteristic skeletons of members of the family Bonnemaisoniaceae were found to coexist in the alga *Delisea fimbriata*. The two new acetates 1 and 2a were also isolated; this is the first isolation of acetates from this genus. The structures, chemical transformation, and biogenetic significance of 1 and 2a are described. (Auth.)

#### B-57253

Möller, C., Dreyfuss, M.M., **Microfungi from Antarctic lichens, mosses and vascular plants**, *Mycologia*, Nov.-Dec. 1996, 88(6), p.922-933, Refs. p.931-933.

Microfungi were isolated from 54 lichen, moss and plant samples collected at Arctowski and Jubany stations on King George I. Fifty-eight taxa, mainly fungi imperfecti, and 63 different types of sterile mycelia were isolated. Seventeen of the identified taxa and 15 sterile types were

relatively abundant and were recorded from three samples or more. The distribution of these taxa in the different sample types was analyzed by correspondence analysis. Geographic sampling site tended to be a more relevant indicator of taxonomic composition of moss- and lichen-derived fungal assemblages than the exact nature of the sample. In contrast, some plant-derived species were similar in all plants irrespective of sampling site. In general, the distribution of fungi in samples from Jubany was more distinctive than in Arctowski samples, possibly due to the stronger influence of humans and animals in the vicinity of the latter station. With respect to temperature requirements for radial growth, 44% of all isolates were mesophilic, 46% psychrotolerant and 10% psychrophilic. (Auth. mod.)

#### B-57254

Gómez, I., Weykam, G., Klöser, H., Wiencke, C., **Photosynthetic light requirements, metabolic carbon balance and zonation of sublittoral macroalgae from King George Island (Antarctica)**, *Marine ecology progress series*, Mar. 20, 1997, 148(1-3), p.281-293, Refs. p.292-293.

Photosynthesis, dark respiration, chlorophyll *a* contents and daily metabolic C balance were determined in 5 species of brown and red algae from Potter Cove during spring. *In situ* irradiance data were used to determine the light requirements of plants collected at 10, 20 and 30 m depth. Average daily maximum quantum irradiances measured in spring-summer reached up to 23  $\mu\text{mol photons/m}^2/\text{s}$  at 30 m depth. Net photosynthetic rates ( $P_{\text{max}}$ ) were high in the brown alga *Desmarestia anceps* and the red alga *Palmaria decipiens*. The daily carbon balance decreased with depth. At 30 m, algae exhibited C gains lower than 1 mg C/g FW/d and in *D. anceps*, due to its high respiration rates, carbon balance was negative at saturation and compensation irradiances. In general, greater C gains relative to losses were found in plants growing at 20 m depth. Although data on  $P_{\text{max}}$ ,  $\alpha$ ,  $I_c$  and  $I_k$  indicate that antarctic macroalgae are metabolically able to inhabit greater depths during spring-summer, the shortening of the daylengths for which algae are exposed to saturating or compensating irradiances impose a maximum depth limit of around 30 m. (Auth. mod.)

#### B-57256

Starý, J., Block, W., Greenslade, P., **Oribatid mites (Acari: Oribatida) of sub-Antarctic Heard Island**, *Journal of natural history*, Apr. 1997, 31(4), p.545-553, 25 refs.

Nine species of oribatid mites were represented in heat-extracted samples of soil and plant material and from pitfall trapping in the 5 main terrestrial plant communities on Heard I. Three species, *Asutroppia crozetensis* (Richters, 1908), *Globoppia loxolineata* (Wallwork, 1965) and *Halozetes marionensis* Engelbrecht, 1974, are recorded from Heard I. for the first time. The zoogeographical relationships of the Heard I. oribatid mite fauna with those of other subantarctic islands and antarctic zones are discussed. It is concluded that the low taxonomic diversity (with zero endemism) is partly a reflection of the small ice-free area on Heard I., and that its depauperate fauna is transitional between those of the maritime and subantarctic zones. (Auth.)

#### B-57260

Flower, R.J., Jones, V.J., Round, F.E., **Distribution and classification of the problematic *Fragilaria (Virescens V.) Exigua* Grun./ *Fragilaria exiguiformis* (Grun.) Lange-Bertalot: a new species or a new genus?**, *Diatom research*, 1996, 11(1), p.41-57, 24 refs.

The distribution of this taxon in relation to pH is described from surface sediment samples collected from more than 200 soft-water lakes in both NW Europe and Antarctica. The optimum pH requirement is shown to be different in the two regions with a lower optimum (pH 5.7) for the European data set. One reason for this difference is the lack of moderately acid sites in the antarctic data set. Another is that SEM investigation of *Fragilaria exiguiformis* from several localities shows that at least two taxa, characterized *inter alia* by presence or absence of spines, are present within this species. Lack of a rimoportula indicates that taxa in the *F. exiguiformis* complex should be transferred elsewhere. Also, the recognition of a non-spinose taxon within *F. exiguiformis* indicates that a new species description is required. Consequently and because the species complex cannot be incorporated satisfactorily into existing genera, a new genus, *Stauroforma*, and a new species, *S. inermis* are described. The spe-



cies epithet is retained for the spinose taxon which becomes *S. exiguiformis*. Only *S. inermis* occurs in the antarctic samples but both species frequently co-occur elsewhere. These two species have different ecological optima but since they cannot be easily separated by the light microscope using bright-field or phase contrast optics, their relative distributions and ecological preferences in NW European lakes remain uncertain. (Auth. mod.)

#### B-57261

Riaux-Gobin, C., Compère, P., **Observations on the polymorphism of *Cocconeis californica* Grunow** [Observations sur le polymorphisme de *Cocconeis californica* Grunow, aux îles Kerguelen], *Diatom research*, 1996, 11(1), p.89-104, In French with English summary and figure captions. 24 refs.

The diatom genus *Cocconeis* is represented at Kerguelen (Subantarctic archipelago) by numerous marine coastal species. Several species that are abundant in the Morbihan Bay present remarkable morphological variations of length and ornamentation. Is it useful to distinguish several taxa, as proposed by some authors, or would it be better to consider all these related forms as belonging to the same taxon? Among these species *Cocconeis californica* Grunow shows, in the prospected areas, a surprisingly high diversity in shape and ornamentation, which may be responsible for doubtful descriptions in the past. More or less recent descriptions and drawings of several taxa, very close to *C. californica*, are compared. It has been possible to examine the types of most taxa included in this group. Microphotographs (light microscopy and scanning electron microscopy) are presented in order to illustrate the diversity encountered at Kerguelen. Besides *C. californica* var. *californica*, it is proposed to maintain var. *kerguelensis*, the characteristics of which are well defined, but keeping in mind that at Kerguelen, this variety is part of a continuum. A third possible variety, *C. californica* var. *lengana*, has not been observed at Kerguelen. The relatively small length of this species in Kerguelen area is probably not related to insularity. (Auth. mod.)

#### B-57266

Thiriou-Quievreux, C., Leitão, A., Cuzin-Roudy, J., **Chromosome diversity in Mediterranean and Antarctic euphausiid species (Euphausiacea)**, *Journal of crustacean biology*, May 1998, 18(2), p.290-297, Refs. p.296-297.

Chromosome number and morphology were studied in gonadal tissue from 8 euphausiid species, using an air-drying technique and Giemsa staining. Among antarctic species, haploid chromosome numbers were: n=17 in *Euphausia superba*, n=20 in *Thysanoessa macrura*, and n=13 in *Thysanoessa vicina*. Cytotaxonomic differences in haploid chromosome number allow the discrimination of morphologically neighboring sympatric species (e.g., *Meganctiphanes norvegica* and *Nyctiphanes couchi*; *T. vicina* and *T. macrura*). Euphausiids share common chromosomal features which clearly separate them from other eucarids, i.e., a narrow range of haploid chromosome number, a large chromosome size, and a majority of metacentric chromosomes. (Auth. mod.)

#### B-57267

Swadling, K.M., Gibson, J.A.E., Ritz, D.A., Nichols, P.D., Hughes, D.E., **Grazing of phytoplankton by copepods in eastern Antarctic coastal waters**, *Marine biology*, Apr. 1997, 128(1), p.39-48, Refs. p.47-48.

Chlorophyll *a*, primary productivity and grazing by copepods on phytoplankton were measured in the upper water column during the summer of 1994-95 at a coastal site near Davis Station. Chlorophyll *a* was at a maximum in mid-Dec. then dropped markedly as the coastal fast ice melted and broke-out. Phytoplankton biomass increased again from mid-to late-Feb. Copepods accounted for at least 65% of zooplankton biomass in the water column before sea ice break-out, whereas larval polychaetes and ctenophores dominated after ice break-out. *Oncaea curvata* was the numerically dominant species throughout the study. The highest grazing rate was recorded on Dec. 21 when *O. curvata* accounted for 64% of the total. Grazing had decreased markedly by Dec. 28.; *O. curvata* accounted for over 50% of the total ingested. Copepod grazing increased after ice break-out until the last experiment Feb. 20. The main species responsible for grazing during this period were *O. curvata*, *Oithona similis*, *Cal-*

*anoides acutus* and unidentified copepod nauplii. It was estimated that copepods removed between 1 and 5% of primary productivity. (Auth. mod.)

#### B-57268

De Broyer, C., Jazdzewski, K., **Biodiversity of the Southern Ocean: towards a new synthesis for the Amphipoda (Crustacea)**, *Verona. Museo civico di storia naturale. Bollettino*, 1993 (Pub. Oct. 31, 1996), Vol.20, p.547-568, With Italian summary. Refs. p.564-568.

On the basis of a recent inventory of amphipod fauna in the southern ocean, the authors review some aspects of the species and their taxonomic diversity, and geographic and bathymetric distribution, with emphasis on the eco-functional diversity of the amphipods in the antarctic benthic communities. Some gaps in taxonomic knowledge and the evaluation of amphipod fauna in antarctic and subantarctic regions are pointed out. It is concluded that the peracarid Crustacea represent the largest number of species in the southern ocean, with more than 1,000 species from the Antarctic; and that the amphipods, with 531 antarctic species, are the most diverse. Some possible causes of this high amphipod diversity are discussed. (Auth. mod.)

#### B-57278

Castellini, M.A., Zenteno-Savin, T., **Heart rate scaling with body mass in pinnipeds**, *Marine mammal science*, Jan. 1997, 13(1), p.149-155, Refs. p.153-155.

Recent data on the diving behavior of pinnipeds have shown that some species, such as northern elephant seals (*Mirounga angustirostris*), can spend over 90% of their time at sea submerged under water. For these seals the most common physiological state while they are away from shore is that of breath-holding. During this time they forage, gain mass, gestate the fetus, swim, sleep, and dive. This suggests an interesting regulatory enigma in cardiac physiology. Because heart rate is lower during apnea than during eupnea and because the apneic state represents most of the time spent at sea, then it should follow that the metabolic demands of the pelagic seal (gestation, digestion, etc.) are met at the lower, diving heart rate. Under these criteria, the apneic heart rate could be considered to be the maintenance or resting heart rate for seals, and the eupneic surface heart rate could be considered tachycardia. Here the authors provide a new method of testing the theory by examining the relationship of heart rate to body mass.

#### B-57279

Sidell, B.D., et al, **Variable expression of myoglobin among the hemoglobinless Antarctic icefishes**, *National Academy of Sciences. Proceedings*, Apr. 1, 1997, 94(7), p.3420-3424, 31 refs.

The important intracellular oxygen-binding protein, myoglobin (Mb), is thought to be absent from oxidative muscle tissues of the family of hemoglobinless antarctic icefishes, *Channichthyidae*. Within this family of fishes, which is endemic to the southern ocean surrounding Antarctica, there exist 15 known species and 11 genera. To date, the authors have examined 8 species of icefish using immunoblot analyses. Results indicate that Mb is present in heart ventricles from 5 of these species of icefish. Mb is absent from heart auricle and oxidative skeletal muscle of all species. The authors have identified a 0.9-kb mRNA in Mb-expressing species that hybridizes with a Mb cDNA probe from the closely related red-blooded antarctic nototheniid fish, *Notothenia coriiceps*. In confirmation that the 0.9-kb mRNA encodes Mb, the full-length Mb cDNA sequence of the ocellated icefish, *Chionodraco rastrospinosus* is reported. Of the 8 icefish species examined, 3 lack Mb polypeptide in heart ventricle, although one of these expresses the Mb mRNA. All species of icefish retain the Mb gene in their genomic DNA. Based on phylogeny of the icefishes, loss of Mb expression has occurred independently at least 3 times and by at least 2 distinct molecular mechanisms during speciation of the family. (Auth.)

#### B-57280

Tang, E.P.Y., Tremblay, R., Vincent, W.F., **Cyanobacterial dominance of polar freshwater ecosystems: are high-latitude mat-formers adapted to low temperature?**, *Journal of phycology*, Apr. 1997, 33(2), p.171-181, Refs. p.179-181.



Although it is generally believed that cyanobacteria have high temperature optima for growth ( $>20^{\circ}\text{C}$ ), mat-forming cyanobacteria are dominant in many types of lakes, streams, and ponds in the Arctic and Antarctic. The authors studied the effect of temperature on growth ( $\mu$ ) and relative pigment composition of 27 isolates of cyanobacteria (mat-forming Oscillatoriaceae) from the Arctic, subarctic, and Antarctic to investigate whether they are adapted to the low temperature (i.e. psychrophilic) or tolerant of the low temperature of the polar regions (i.e. psychrotrophic). They also derived a parabolic function that describes both the rise and the decline of cyanobacterial growth rates with increasing temperature. The cyanobacteria grew over a wide temperature range (typically  $20^{\circ}\text{C}$ ) but growth rates were low. Extremely slow growth rates at low temperature and the high temperature for optimal growth imply that the cyanobacteria are not adapted genetically to cold temperatures, which characterize their ambient environment. Other competitive advantages such as tolerance to desiccation, freeze-thaw cycles, and bright, continuous solar radiation may contribute to their dominance in polar aquatic ecosystems. (Auth. mod.)

#### B-57281

Nilawati, J., Greenberg, B.M., Smith, R.E.H., **Influence of ultra-violet radiation on growth and photosynthesis of two cold ocean diatoms**, *Journal of phycology*, Apr. 1997, 33(2), p.215-224, Refs. p.223-224.

The influence of chronic exposure to UV-B and UV-A radiation on growth and photosynthesis of two polar marine diatoms (*Pseudonitzschia seriata* and *Nitzschia* sp.) was investigated in cultures exposed to moderate photon fluences for 3-7 days. Population growth rates were diminished 50% by UV-B. Fluorescence induction kinetics of photosystem II (PSII) revealed that UV-B caused lower  $F_v/F_m$  ratios and half-rise times, indicating damage to the reaction center of PSII and to related elements of the photosynthetic electron transport chain. Carbon assimilation rates per cell and per chlorophyll *a* were nonetheless highest for UV-B-exposed populations, which also had the highest chlorophyll *a* content per cell. The UV-B-exposed cells were, however, more vulnerable to visible light-induced photoinhibition. Exposure to UV-A in the absence of UV-B had little effect on growth, fluorescence induction of PSII, or chlorophyll *a* contents but did have some inhibitory effects on carbon assimilation per chlorophyll *a* and per cell. The increased photosynthetic capacity of UV-B-exposed cells suggested some ability to compensate for damage to the photosynthetic apparatus. (Auth.)

#### B-57320

Egorova, E.N., **Principal features of the Antarctic malacofauna (as exemplified by the probranchial gastropods and bivalve molluscs)** [Osnovnye cherty Antarkticheskoi malakofauny (na primere perednizhabernykh briukhonogikh i dvustvorchatykh molliuskov)], *Rossiiskaia Antarkticheskaiia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No.117, p.83-87, In Russian.

The author describes the basic characteristics of the malacological fauna of the inshore waters of Antarctica, including twelve new species, five new genera, and one new family. The generic composition of probranchial gastropods and bivalve molluscs is also described at the species level, with notes on size and vertical distribution down to 1,000 m. The role of molluscs in the food web and the use of their shells both as camouflage and substratum are also considered.

#### B-57321

Gontar', V.I., **New and little known species of Bryozoa (*Bryozoa: Cheilostomata*) from the Antarctic** [Novye i maloizvestnye vidy mshanok (*Bryozoa: Cheilostomata*) iz Antarktiki], *Rossiiskaia Antarkticheskaiia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No.117, p.88-92, In Russian. 4 refs.

The author describes *Arachnopusia decipiens* Hayward and Thorpe, *Porella andrejasheve* Gontar n.sp., and *Microporella delta parasimilis* Morris. Diagrams and tables are used to compare the parameters of the arctic zooid *Microporella ciliata* (Pallas) with those of *Microporella delta parasimilis* Morris from Antarctica.

#### B-57324

Wharton, D.A., Block, W., **Differential scanning calorimetry studies on an Antarctic nematode (*Panagrolaimus davidi*)**

**which survives intracellular freezing**, *Cryobiology*, Mar. 1997, 34(2), p.114-121, 35 refs.

Differential scanning calorimetry was used to characterize thermal events associated with freezing and melting of suspensions and extracts of *Panagrolaimus davidi*, an antarctic nematode which can survive intracellular freezing. Nematode suspensions produced a single freezing exotherm with a shoulder on the peak representing the freezing of the nematodes. A shoulder on the peak of melting endotherms indicates the melting of the nematodes and of the water surrounding them. Exotherms were also detected from individual nematodes mounted in liquid paraffin. The freezing of nematodes was very rapid and in marked contrast to that of freezing-tolerant insects and vertebrates, which take hours or days to freeze. Eighty-two percent of the nematodes' body water froze. High levels of survival were obtained in nematodes exposed to temperatures down to  $-40^{\circ}\text{C}$ . No additional thermal events were observed after the freezing event and before the melting of samples cooled to  $-40^{\circ}\text{C}$ , indicating no changes in the proportion of body water frozen. Ice nucleating activity is present in nematode suspensions but not in supernatants from nematode extracts. No thermal hysteresis activity was detected in nematode extracts. (Auth.)

#### B-57325

Belgian State. Prime Minister's Services. Federal Office for Scientific, Technical and Cultural Affairs (OSTC), **Belgian scientific research programme on the Antarctic. 1992-1996 research results summary**, Brussels, May 1997, 30p., Refs. p.21-27.

This volume presents an overview of the results of the research projects funded under the Third Phase of the Belgian Scientific Research Programme on the Antarctic (1992-1996). The program comprises 7 research projects under 3 priority areas. They are: Ecodynamics of the Southern Ocean and Interactions with the Climate (biogeochemical fluxes and cycles in the main trophic compartments, modelling the global dynamics of ecosystems, assessment of the role of "new production" in the burial of atmospheric  $\text{CO}_2$  by the southern ocean); Evolution and Protection of Marine Ecosystems (application of predictive ecological models to simulate ecosystem responses to man-made climatic disturbances, study of hydrocarbons spills dispersion); and Role of the Antarctic in Global Changes (ocean-cryosphere-atmosphere interactions, sedimentary palaeoenvironment).

#### B-57342

Lascara, C.M., **Seasonal and mesoscale variability in the distribution of antarctic krill, *Euphausia superba*, west of the Antarctic Peninsula**, Norfolk, VA, Old Dominion University, 1996, 167p., University Microfilms order No. 96-24123, Ph.D. thesis. Refs. p.154-166.

Observations collected between Nov. 1991 and Sep. 1993 during 4 multidisciplinary cruises were analyzed to provide a description of seasonal and mesoscale variability in the distribution and abundance of antarctic krill, *Euphausia superba*, within continental shelf waters west of the Antarctic Peninsula and to investigate possible relationships between variability in krill distributions and variability in selected environmental parameters. Spatially-averaged estimates of krill biomass increased three-fold from spring to summer and then decreased by an order of magnitude to the low values observed in fall and winter. The number of aggregations detected per unit sampling effort followed a similar seasonal pattern. A spatial separation in krill size classes was observed in all seasons except winter, with small adults generally located in inshore regions characterized by relatively lower surface salinities. The distribution of large, reproducing adults during the summer was spatially correlated with surface salinities exceeding 33.8 and the presence of Circumpolar Deep Water at depth. (Auth. mod.)

#### B-57346

Block, W., **Cold or drought - the lesser of two evils for terrestrial arthropods?**, *European journal of entomology*, Sep. 30, 1996, 93(3), p.325-339, Refs. p.337-339.

Body water plays an important role in arthropod cold hardiness. Partial dehydration may significantly affect the cold resistance of both freezing tolerant and freezing susceptible forms. An increase in the quantity of unfreezable water in arthropods of both strategies may occur through the production of low molecular weight sugar alcohols (polyols), and desicca-



tion promotes polyol (e.g. glycerol) synthesis in some species. Hibernating insects and other terrestrial arthropods may be threatened by lethal desiccation in their natural habitats, and in cold environments this may be in addition to the possibility of freezing, which could result in death. Whilst the biochemical and physiological similarities of the effects of cold and drought may be obvious, it should not be overlooked that desiccation-tolerant arthropods may be pre-adapted for freezing tolerance. Thus cold and drought should be viewed as not necessarily competing mortality factors in overwintering arthropods, but as producing complementary adaptations for aiding survival in some species. (Auth. mod.)

#### B-57347

Sømme, L., **Anhydrobiosis and cold tolerance in tardigrades**, *European journal of entomology*, Sep. 30, 1996, 93(3), p.349-357, Refs. p.356-357.

A review of the literature regarding anhydrobiosis and cold tolerance in tardigrades is presented. During increasing desiccation, invertebrates like tardigrades, rotifers, nematodes and some collembolans are able to shut down metabolism to undetectable levels. When tardigrades are entering anhydrobiosis, a tun-like structure is formed, facilitated by structural adaptations of the cuticle. Tardigrades in anhydrobiosis may tolerate exposure to freezing temperatures of liquid gases, and some species also survive such temperatures in their hydrated state. Experimental studies from Greenland and the Antarctic suggest that some species overwinter both in a hydrated frozen state and in anhydrobiosis. During the summer, a number of tardigrade species have been recorded from cryoconite holes, formed on the surface of glaciers. These species are freeze tolerant since their habitats are permanently frozen during the winter. (Auth. mod.)

#### B-57348

Convey, P., **Overwintering strategies of terrestrial invertebrates in Antarctica - the significance of flexibility in extremely seasonal environments**, *European journal of entomology*, Sep. 30, 1996, 93(3), p.489-505, Refs. p.501-505.

This paper considers the life histories of subantarctic and antarctic terrestrial invertebrates, to identify features correlated with seasonal and/or climatic cues. There is little evidence for diapause, although seasonal patterns of variation in cold tolerance and cryoprotectant production in direct response to desiccation and decreasing temperatures have been reported. A rapid response to feeding and growth opportunity is shown by maritime antarctic species, irrespective of season, although moulting does not occur over winter. A formal diapause may be a disadvantage in maritime and continental antarctic zones, as it would reduce the opportunity of capitalizing on short periods of optimal environmental conditions, and could be erroneously triggered by severe conditions during summer. In contrast, the development of specific overwintering strategies including diapause may be unnecessary or even irrelevant in much of the subantarctic, where seasonality is greatly reduced and the risk of severe or stressful environmental conditions during winter is negligible. (Auth. mod.)

#### B-57351

Hull, C.L., **Effect of carrying devices on breeding Royal Penguins**, *Condor*, May 1997, 90(2), p.530-534, Refs. p.533-534.

The impact of Time Depth Recorders (TDRs) and VHF transmitters, deployed on Royal penguins (*Eudyptes schlegeli*) to examine foraging behavior, was assessed during all stages of the breeding season. Models of the devices were attached to penguins and compared to control birds with no devices. There were no impacts from transmitters on probability of return from a foraging trip, foraging trip duration, mass gained, water influx, or body composition, but substantial impacts from the TDRs. Attachment of TDRs reduced the likelihood that penguins would continue the breeding attempt, increased foraging trip duration, increased water influx, and decreased fat levels. The effects varied with sex and stage in the breeding season, which appeared to be related to the energetic demands of the stage in the breeding season. TDRs probably increased drag, affecting swimming speed and foraging success. The differential impact of the devices is most likely related to their cross-sectional area and streamlining, with TDRs being larger and less streamlined than transmitters. (Auth.)

#### B-57352

Garcia, V., Jouventin, P., Mauget, R., **Parental care and the pro-**

**lactin secretion pattern in the King penguin: an endogenously timed mechanism?**, *Hormones and behavior*, Sep. 1996, 30(3), p.259-265, Refs. p.264-265.

The mechanism of the maintenance of prolactin was studied during the parental care period in the King penguin, a period which is unusually long. In many species, prolactin secretion has been shown to be stimulated by the presence of eggs and/or chicks, but in the King penguin, prolactin secretion is observed throughout the entire period of parental care, despite the fact that the birds leave the egg and the chick repeatedly and for extended periods of time to feed. Prolactin levels rise significantly at the beginning of courtship; females have significantly higher prolactin levels than males during courtship, copulation, and the period of waiting for egg laying. In both sexes, prolactin levels remain high during incubation and the first part of chick rearing, before winter. Prolactin concentrations decline somewhat during the winter period of minimal parental care, but remain at that level in spring when parental care starts again. The level returns to basal value during molt. The hypothesis of a programmed secretion of prolactin is advanced. (Auth. mod.)

#### B-57353

Bevan, R.M., Boyd, I.L., Butler, P.J., Reid, K., Woakes, A.J., Croxall, J.P., **Heart rates and abdominal temperatures of free-ranging South Georgian shags, *Phalacrocorax georgianus***, *Journal of experimental biology*, Feb. 1997, 200(4), p.661-675, Refs. p.674-675.

In this study, heart rates and abdominal temperatures were recorded continuously in 4 free-ranging South Georgian shags using an implanted datalogger. A time-depth recorder was also attached to the back of the implanted birds to record their diving behavior. Maximum dive durations for individual birds ranged between 140 and 287 s, and maximum depths between 35 and 101 m. The mean heart rate during diving was not significantly different from the resting values, but the minimum heart rate during a dive was significantly lower. The minimum heart rate during a dive was negatively correlated with both dive duration and dive depth. Abdominal temperature fell progressively during a diving bout. The minimum heart rate during diving is at a sub-resting level, which suggests that the South Georgian shag responds to submersion with the 'clastic' dive response of bradycardia and the associated peripheral vasoconstriction and utilization of anaerobic metabolism. (Auth. mod.)

#### B-57354

Franklin, C.E., Johnston, I.A., **Muscle power output during escape responses in an antarctic fish**, *Journal of experimental biology*, Feb. 1997, 200(4), p.703-712, Refs. p.711-712.

Escape responses (C-shaped fast-starts) were filmed at 500 frames/s in the antarctic rock cod (*Notothenia coriiceps*) at 0°C. The activation and strain patterns of the superficial fast myotomal muscle were measured simultaneously using electromyography and sonomicrometry, respectively. In order to bend the body into the initial C-shape, the muscle fibers in the rostral myotomes shortened by up to 13% of their resting length at a maximum velocity of 1.68 fiber lengths/s. During the contralateral contraction, muscle fibers were stretched and were activated prior to the end of lengthening, before shortening by up to 12% of resting fiber length (peak-to-peak strain). Representative strain records were digitized to create cyclical events corresponding to the C-bend and contralateral contraction. Isolated fibers were subjected to the abstracted strain cycles and stimulated at the same point and for the same duration as occurs *in vivo*. *In vitro* experiments, involving adjusting strain, cycle duration and stimulation parameters, indicated that *in vivo* muscle fibers produce close to their maximum power. (Auth. mod.)

#### B-57355

Delille, D., Bassères, A., Dessommès, A., **Seasonal variation of bacteria in sea ice contaminated by diesel fuel and dispersed crude oil**, *Microbial ecology*, Mar.-Apr. 1997, 33(2), p.97-105, 64 refs.

The long-term effects of diesel fuel and "Arabian light" crude oil contamination on microbial communities was investigated in land-fast ice located in the Adélie Coast area. After oil addition, the changes in bacterial communities were studied *in situ* during a 9-month period in winter 1993. Weekly sampling in sea ice allowed a regular survey of total, saprophytic, and hydrocarbon utilizing bacteria. A clear seasonality was



observed. In uncontaminated samples, maximal values of bacterial biomass occurred during ice formation and just before summer thaw. Minimal bacterial abundance was observed during winter. All the results (bacterial abundance, colony-forming units, and most probable number counts of hydrocarbon-utilizing bacteria) clearly revealed a significant response of antarctic bacterial communities to hydrocarbon contamination. Three orders of magnitude increases of bacterial counts occurred in sea ice after both diesel fuel and crude oil contamination. (Auth. mod.)

#### B-57356

Harris, J.M., Tibbles, B.J., **Factors affecting bacterial productivity in soils on isolated inland nunataks in continental Antarctica**, *Microbial ecology*, Mar.-Apr. 1997, 33(2), p.106-123, 74 refs.

Heterotrophic bacterial production rates in soils on inland nunataks in western Queen Maud Land were investigated by field and laboratory experiments. Bacterial densities and productivities, and nutrient and physical parameters of soils from 4 different habitats were compared: soil from beneath moss beds, soil from the nests of the snow petrel (*Pagodroma nivea*), exposed unvegetated soil (polygon soil) 5 m away from nests, and exposed polygon soil on nunataks without the nests of breeding birds. Organic content, and nitrogen and carbon concentrations were significantly higher in soils from nests of the snow petrel than in all other soil types. Moisture levels in soils from nest entrances and beneath mosses were much higher than in soils from unvegetated exposed polygons. Polygon soils from nunataks without breeding birds exhibited the lowest nutrient content. Soils in nests and moss beds represent bacterial "hotspots" in an extensive matrix of exposed polygon soils, supporting denser bacterial populations and enhanced bacterial productivity. (Auth. mod.)

#### B-57385

Woehler, E.J., **Distribution and abundance of Antarctic and Subantarctic penguins**, Cambridge, UK, Scientific Committee on Antarctic Research (SCAR), 1993, 76p., 132 refs.

This report provides the second comprehensive summary of the global distribution and abundance of antarctic and subantarctic penguins. It replaces the previous treatment by Wilson (1983), which reviewed data up to and including the 1978-79 antarctic summer season, by incorporating the extensive new information produced over the last decade. All the new information is summarized, which includes major regional surveys of the Antarctic Peninsula, South Orkney Is., South Shetland Is., Weddell Sea, Ross Sea, Adélie Coast, and much of East Antarctica.

#### B-57387

Kameyama, K., et al, **Analysis of the phospholipase C gene of *Clostridium perfringens* KZ1340 isolated from Antarctic soil**, *Microbiology and immunology*, 1996, 40(4), p.255-263, 33 refs.

*Clostridium perfringens* KZ1340 isolated from antarctic soil was first classified as *Clostridium plagarum* and later as a lecithinase-negative variant of *C. perfringens*. Although the strain produced no detectable lecithinase (phospholipase C, PLC) activity in the culture supernatant, it was shown by Southern blot hybridization to possess a PLC-encoding gene (plc). To determine the cause of the PLC deficiency, the authors cloned and sequenced the plc gene from KZ1340. Tyrosine was substituted for histidine at amino acid position 148. Northern blot analysis revealed that KZ1340 expressed the plc gene at an extremely low level. The plc gene cloned from *C. perfringens* strain 13 into a plasmid was expressed weakly in KZ1340, compared to that in strain 13. This indicates that the former strain represses plc gene expression in trans. When a phylogenetic tree of plc genes was constructed, the KZ1340 plc gene formed a monophyletic branch along with those of various other *C. perfringens* strains, supporting the classification of the strain as a variant of *C. perfringens*. (Auth. mod.)

#### B-57395

Matsuhiro, B., **Vibrational spectroscopy of seaweed galactans**, *Hydrobiologia*, July 26, 1996, Vol.326/327, p.481-489, Refs. p.488-489.

A review of literature data on vibrational spectroscopy of sulfated polysaccharides and new results are presented. Agar-type polymers showed two diagnostic bands in the second-derivative mode in the region 800-700/cm. Carrageenans exhibited a number of bands in the region 1600-1000/cm. Fourier transform laser Raman spectroscopy in the solid

state gave well-defined characteristic spectra of agar and carrageenans. Both techniques can be applied to small samples in the solid state and allow differentiation in a few minutes between agar and carrageenan-type seaweed galactans. The second-derivative mode of the FT-IR spectra can be applied to distinguish agar-producing from carrageenan-producing seaweeds. The spectra on KBr pellets of dried, ground agarophyte and carrageenophyte seaweed samples from King George I. showed the same bands as the corresponding polysaccharides. (Auth. mod.)

#### B-57396

Matsuhiro, B., Urzúa, C.C., **Acidic polysaccharide from *Palmaria decipiens* (Palmariales, Rhodophyta)**, *Hydrobiologia*, July 26, 1996, Vol.326/327, p.491-495, 25 refs.

*Palmaria decipiens* collected in King George I. was analyzed. The hot water extract (26% yield) showed by acid hydrolysis to contain xylose, galactose and traces of glucose. Fractionation with cetrimide gave a soluble neutral xylan and an insoluble fraction. The insoluble fraction afforded an acidic polysaccharide that contained 4.8% of uronic acids, 2.8% of sulfate and 18.9% of protein. Polyacrylamide gel electrophoresis showed that it was homogeneous. The GLC and HPLC analysis of the total acidic hydrolysis products showed that the acidic polysaccharide was composed of the neutral sugars galactose and xylose in the molar ratio 8.2:1.0 and of galacturonic and glucuronic acid in the ratio 1.5:1.0. Results suggest that the acidic polysaccharide extracted from *P. decipiens* is an acidic xylogalactan-protein complex. (Auth. mod.)

#### B-57413

Davenport, J., **Comparisons of the biology of the intertidal subantarctic limpets *Nacella concinna* and *Kerguelenella lateralis***, *Journal of molluscan studies*, Feb. 1997, 63(1), p.39-48, Refs. p.47-48.

Two limpet species occur intertidally on South Georgia, the patellid *Nacella concinna* and the siphonariid *Kerguelenella lateralis*. *N. concinna* is confined to the lower shore close to LWS; *K. lateralis* occurs in middle shore pools. *N. concinna* has a much narrower thermal niche than *K. lateralis*. Environmental data are presented to show that the upper lethal temperature of *N. concinna* is low enough to prevent the limpet living higher on the shore. Both limpet species are slow-moving, but *K. lateralis* shows increasing speed with rising temperature, peaking at 15-20°C. In contrast, *N. concinna* moves actively down to -1.9°C, but there is a steady decrease in speed of locomotion above +2°C. Gulls ate *N. concinna* as small as 11 mm shell length (within the size range of *K. lateralis*). Experiments on gulls demonstrated an unwillingness to eat *K. lateralis*, probably because the siphonariid extrudes a viscid white mucus when the foot is touched. (Auth. mod.)

#### B-57417

Zadróžny, T., **Fishes of Admiralty Bay caught in 1994 and 1995 (King George Island, South Shetland Islands, Antarctica)**, *Polskie archiwum hydrobiologii. Polish archives of hydrobiology*, 1996, 43(3), p.347-354, 21 refs.

Fish catches with dredges, gill-nets, fishing rods and traps were made in the period from Feb. 1994 to Feb. 1995. Twelve fish species representing 4 families were caught. The species *Notothenia coriiceps*, *Lepidonotothen nudifrons*, *Notothenia rossii* and *Trematomus newnesi* were most frequently caught. In Herve Cove, a glacier-adjacent small bay, the exclusive presence of only *N. coriiceps* was recorded; the bay is a feeding ground for this species. No distinct differences were noted in the body lengths (SL) of *N. coriiceps* caught in Herve Cove and in the open waters of Admiralty Bay. Comparison of the present data with earlier results showed a change during the last 20 years, from domination of *N. rossii* to that of *N. coriiceps*. (Auth.)

#### B-57418

Kulesz, J., Zadróžny, T., **Biology of *Trematomus newnesi* Boulenger 1902 (King George Island, Antarctica)**, *Polskie archiwum hydrobiologii. Polish archives of hydrobiology*, 1996, 43(3), p.355-364, Refs. p.363-364.

*Trematomus newnesi* from the Admiralty Bay had a length of 6 to 21 cm (average 11.8 cm). The fish age oscillated between 1 and 6 years; the age determination based on the scales and otoliths examination was accurate in 74%. The age and gonad maturity stages analysis point to the



Admiralty Bay as the site of the species permanent dwelling. The morphologic analysis placed *T. newnesi* among the pelagic species. Dendrite based on morphological features compared with a cluster of anatomic features confirmed links between these qualities. (Auth.)

**B-57422**

Gill, P.C., Thiele, D., **Winter sighting of killer whales (*Orcinus orca*) in Antarctic sea ice**, *Polar biology*, May 1997, 17(5), p.401-404, 17 refs.

A group of killer whales was sighted in open leads well inside antarctic sea ice during Aug. 1995. This was the first winter sighting of killer whales in antarctic waters since 1955, and contradicts the view that all killer whales migrate north prior to the winter. A small calf was observed, providing the first evidence of a cetacean species breeding in antarctic waters. Several potential prey species were also present. The sighting highlights the importance of lead and polynya systems to marine mammals, which probably use them to disperse within the winter sea-ice zone. (Auth.)

**B-57423**

Tatur, A., Myrcha, A., Niegodzisz, J., **Formation of abandoned penguin rookery ecosystems in the maritime Antarctic**, *Polar biology*, May 1997, 17(5), p.405-417, Refs. p.415-417.

Due to regional glacio-isostatic uplift of land during the Holocene period, a large number of penguin populations from several rookeries began to nest on the newly formed beaches and emerged rocks, leaving previously colonized higher cliffs. Chronology and extent of raised beaches, lichenometric age estimation of *Usnea antarctica* and radiocarbon-dating of guano and subfossil penguin bones in the abandoned nesting sites suggest the progress of the downward movement of many rookeries about 2500 years ago, accelerated during the last millennium, when wide bands of 4 to 6 m raised beaches were formed. Patterns of relic ornithogenic soil formation in the abandoned rookeries, as well as the succession of vegetation in the age sequence of abandoned nesting sites, were investigated in detail at Stranger Point, King George I. The chemical composition of *Deschampsia antarctica* growing in the area of active, abandoned rookeries and in control sites provides direct and indirect evidence of current and past ornithogenic manuring on nutrition of vegetation. (Auth.)

**B-57424**

Errhif, A., Razouls, C., Mayzaud, P., **Composition and community structure of pelagic copepods in the Indian sector of the Antarctic Ocean during the end of the austral summer**, *Polar biology*, May 1997, 17(5), p.418-430, Refs. p.428-430.

The paper describes latitudinal and vertical changes in the composition, abundance and diversity of copepods in the Indian sector of the Antarctic. Highest copepod densities were noted between the Antarctic Divergence and the Antarctic Convergence, with a maximum in the Antarctic Divergence zone, particularly in the upper levels of the water column. A total of 80 copepod species were identified over the entire survey area. Generally, small copepods, particularly *Oithona similis*, *Oithona frigida* and *Ctenocalanus citer*, dominated in both antarctic and subantarctic areas. The contribution of large species to total copepod numbers was much lower. Correspondence analysis showed a marked latitudinal gradient in population structure with 4 groups of samples and species corresponding to 4 latitudinal zones. Community structure and species abundance patterns suggested that the maturity and species richness increased gradually from south to north. A low diversity index and evenness were observed in the area of the Antarctic Divergence, whereas the Convergence zone showed high diversity and evenness. Conversely, the frontal zone showed high diversity and evenness. Distribution appeared unrelated to chlorophyll concentrations and on the large scale was related to the hydrologic characteristics. (Auth. mod.)

**B-57425**

Favero, M., Silva, P., Ferreyra, G., **Trophic relationships between the kelp gull and the Antarctic limpet at King George Island (South Shetland Islands, Antarctica) during the breeding season**, *Polar biology*, May 1997, 17(5), p.431-436, Refs. p.435-436.

The diet of the kelp gull (*Larus dominicanus*), its foraging behavior and the consumption rates on the antarctic limpet (*Nacella concinna*) were studied during spring and summer 1992-93 and 1993-94 at Potter Peninsula. Limpets were the most important prey followed by scavenged prey (penguin and seal carcasses), amphipods, snails, fish and euphausiids. Foraging gulls spent 51% of the time searching for limpets, 10% moving between foraging areas, 9% in catching effort and 15% handling prey. The number of gulls observed searching for limpets was inversely correlated with the tidal height. Total consumption rate estimations for the whole population of gulls at Potter Peninsula reached between 3400 and 4800 limpets/day, which represents approximately 10-14% of the total annual limpet mortality. (Auth. mod.)

**B-57426**

Janssen, H.H., **Epizoid bacteria on the foot of the Antarctic bivalve, *Lissarca notorcadensis* Melville and Standen, 1907 (Filibranchia: Philobryidae)**, *Polar biology*, May 1997, 17(5), p.437-447, Refs. p.445-447.

Specimens of the epizoid bivalve *Lissarca notorcadensis* were collected from the spines of cidaroid sea-urchins in the Weddell Sea during the summer of 1991. Epizoid bacteria were discovered on the foot in 14 out of 15 specimens of the bivalve, and in juveniles as well as in adults. This is the first time that epizoid bacteria have been described, either from an antarctic bivalve or from the foot epithelium of any bivalve species. The bacteria could contribute to the nutrition of their host by breaking down macromolecular or particulate organic matter, which would facilitate parenteral absorption by the bivalve, as well as eventual digestion. The ultra-structural findings suggest that the bacteria are neither sulphidotrophic nor methylotrophic. Based on their appearance, they are classified as sub-cuticular bacteria, which have been recently described from the surface epithelia in various marine invertebrate species. The phenomenon is discussed in respect to seasonal food limitation for antarctic suspension feeders and the brooding behavior of the host species and its ecological success. (Auth. mod.)

**B-57427**

Brey, T., Mackensen, A., **Stable isotopes prove shell growth bands in the Antarctic bivalve *Laternula elliptica* to be formed annually**, *Polar biology*, May 1997, 17(5), p.465-468, Refs. p.467-468.

Growth marks in calcareous shells or skeleton parts of benthic invertebrates are often assumed to be formed annually and hence are used for ageing purposes. For some antarctic species this assumption has been validated by tagging experiments or direct monitoring of growth throughout the year. Here the authors use the record of stable isotope ratios ( $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$ ) deposited in shell carbonate of *Laternula elliptica* from King George I. to demonstrate that shell growth bands are formed annually in this species. (Auth.)

**B-57428**

Weidinger, K., **Breeding cycle of the Cape petrel *Daption capense* at Nelson Island, Antarctica**, *Polar biology*, May 1997, 17(5), p.469-472, 14 refs.

Timing and duration of the breeding cycle of the Cape petrel *Daption capense* were studied during 1990-91 and 1991-92 at Nelson I. In 1991-92 the copulatory period extended over 53 days, with median date and a peak about 28 and 19 days, respectively, before the median date of laying. Laying began 85 days after arrival, with mean (= median) date on Dec. 2. The distributions of laying, hatching and fledging dates showed a similar degree of synchrony and did not differ between seasons. Incubation and chick period were equally long (46 days), the former being less variable. Mean completed nesting cycle (92 days) was about 2 days shorter at Nelson I. than elsewhere and tended to shorten as the breeding season progressed. Its mean length represented 86% of the whole nesting period (107 days), which in turn represented 56% of the period of continuous colony attendance. Timing and duration of nesting stages did not differ between colonies or sets of nests subjected to various levels of disturbance. (Auth.)

**B-57433**

Bowman, J.P., McCammon, S.A., Skerratt, J.H., ***Methylosphaera hansonii* gen. nov., sp. nov., a psychrophilic, group I methanotroph from Antarctic marine-salinity, meromictic lakes**,



*Microbiology*, Apr. 1997, 143(4), p.1451-1459, Refs. p.1458-1459.

Methanotrophic bacteria were enumerated and isolated from the chemocline and surface sediments of marine-salinity antarctic meromictic lakes located in the Vestfold Hills. Most probable number (MPN) analysis indicated that at the chemocline of Ace Lake the methanotroph population made up only a small proportion of the total microbial population and was sharply stratified, with higher populations detected in the surface sediments collected at the edge of Ace Lake and Burton Lake. Methanotrophs were not detected in Pendant Lake. Only a single phenotypic group of methanotrophs was successfully enriched, enumerated and isolated into pure culture from the lake samples. Strains of this group were non-motile, coccoidal in morphology, did not form resting cells, reproduced by constriction, and required seawater for growth. The strains were also psychrophilic, with optimal growth occurring at 10-13°C and maximum growth temperatures of 16-21°C. On the basis of polyphasic taxonomic characteristics the antarctic lake isolates represent a novel group I methanotrophic genus with the proposed name *Methylosphaera hansonii* (type strain ACAM 549). (Auth. mod.)

#### B-57440

Van den Brink, N.W., **Directed transport of volatile organochlorine pollutants to polar regions: the effect on the contamination pattern of antarctic seabirds**, *Science of the total environment*, May 9, 1997, 198(1), p.43-50, 29 refs.

Polychlorinated biphenyls (PCBs) and hexachlorobenzene (HCB) were analyzed in preen oil from birds from Antarctica, subantarctic and Europe. Antarctic and subantarctic birds contained unexpected high levels of volatile PCB-congeners and HCB compared to birds from temperate areas. This shows that the so-called cold-condenser effect causes concentrations of volatile organochlorine pollutants in antarctic top-predators that are higher than in animals in more moderate climates close to the source of these pollutants. Antarctic top predators can be regarded as an utmost sink for volatile persistent pollutants. The levels of HCB indicate that seabirds from subantarctic regions are at risk to effects of organochlorine pollutants. Antarctic birds are also potentially at risk, because of the high levels of HCB in combination with their extreme variability in physiological condition throughout the breeding season. (Auth. mod.)

#### B-57443

Vinogradova, N.G., Galkin, S.V., Kamenskaia, O.E., Levenshtein, R.I.A., Romanov, V.N., **Quantitative characteristics of the bottom fauna off Elephant I.** [Nekotorye dannye o kolichestvennoi kharakteristike donnoi fauny raiona o-va Mordvinova (Iuzhnye Shetlandskie ostrova)], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1990, Vol.126, p.40-44, In Russian with English summary. 4 refs.

**DLC GC1.A4T.126 1990**

Data on quantitative distribution of the bottom fauna were collected in the region of Elephant I, at depths of 40-4190 m. The benthic biomass changed from 531.7 g/m<sup>2</sup> to 4.2 g/m<sup>2</sup>, and the number of organisms from 3500-4000 ind./m<sup>2</sup> to 200 ind./m<sup>2</sup>. The Polychaeta, Crustacea and Ascidia dominated. The biomass of the bottom fauna was the same as it is known in the eutrophic regions of the North Atlantic. (Auth.)

#### B-57444

Keller, N.B., **Antarctic and subantarctic distribution of madreporic corals** [K voprosu o rasprostranении madreporovykh korallov v Antarktike i subantarktike], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1990, Vol.126, p.74-79, In Russian with English summary. 5 refs.

**DLC GC1.A4T.126 1990**

Based on analysis of samples collected in the antarctic and subantarctic regions, some characteristics and geographic distribution of madreporic corals are discussed. It is found that the antarctic madreporic species occur at wider bathymetric intervals than species of the same genera which populate warmer waters. It is concluded that only the species which can live in wide bathymetric intervals can cross the Antarctic Convergence. (Auth. mod.)

#### B-57445

Zevina, G.B., **Deep-sea Cirripedia Thoracica of the South Atlantic** [Glubokovodnye usonogie raki (Cirripedia, Thoracica) Iuznoi Atlantiki], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1990, Vol.126, p.80-89, In Russian with English summary. 22 refs.

**DLC GC1.A4T.126 1990**

Eight abyssal species of Cirripedia Thoracica were found in the South Atlantic; the author adds 2 abyssal and 1 bathyal species, 2 of them new. Deep-sea Cirripedia of the South Atlantic are found to have the following areals: cosmopolitan, Atlantic and Indian oceans, South-Atlantic, and antarctic and Atlantic oceans. (Auth.)

#### B-57446

Kudinova-Pasternak, R.K., **Tanaidacea from southeastern Atlantic Ocean and north of Elephant I.** [Tanaidatsei (Crustacea, Malacostraca) iz iugo-vostochnoi chasti Atlanticheskogo okeana i iz raiona k severu ot o-va Mordvinova (Elefant)], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1990, Vol.126, p.90-107, In Russian with English summary. 19 refs.

**DLC GC1.A4T.126 1990**

Tanaidacea samples collected by r/v *Akademik Kurchatov* during its 43rd cruise were studied. Twenty species were identified, 7 of which are new and are described. Two new species belong to new genera, *Cristatana n.gen.* and *Pseudomacrinella n.gen.* Five species are recorded from the Southern Hemisphere for the first time. Some comments on the geographic and bathymetric distribution of the tanaids are presented, and possible ways of their dispersion are discussed. (Auth. mod.)

#### B-57447

Turpaeva, E.P., **Pycnogonida from the South Atlantic** [Mnogokolenchatye (Pycnogonida) iuzhnoi chasti Atlanticheskogo okeana], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1990, Vol.126, p.108-126, In Russian with English summary. 27 refs.

**DLC GC1.A4T.126 1990**

The *Akademik Kurchatov* 43rd cruise in the Atlantic Ocean yielded 12 species of Pycnogonida. *Nymphon australe* Hodgson, *N. neumayri* Gordon, *N. multidentis* Gordon, *N. proceroides* Bouvier, *Achelua (Ignavogriphus) spicata* Hodgson, and *Austopallene cornigera* (Möbius) were collected from shallow waters near Elephant I. *Nymphon procerum* Hoek, *Colossendeis gracilis* Hoek, *C. macerrima* Wilson, *Pantopipetta brevicauda* Stock, *P. angusta* Stock, and *Austrodecus valdiviens* sp. n.—deep-water species—were collected in the South Atlantic. Previously collected specimens of genus *Pantopipetta* (*P. longituberculata* Turpaeva, *P. brevicauda* Stock and *P. brevopilata* sp. nov.) from the Antarctic are re-described. (Auth.)

#### B-57451

Vinogradova, N.G., Gebruk, A.V., Romanov, V.N., Kamenskaia, O.E., **Abyssal bottom fauna of the Weddell and Scotia seas** [Abissal'naia donnaia fauna morei Ueddella i Skotii i Argentiskoï kotloviny po materialam 43-reisa NIS "Dmitrii Mendeleev"], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1993, Vol.127, p.34-49, In Russian with English summary. 11 refs.

**DLC GC1.A4T.127 1993**

A comparative analysis is presented of quantitative distribution and taxonomic composition of deep-sea bottom fauna in the Weddell Sea, Scotia Sea and the Argentine basin. The highest biomass of bottom fauna (15.5 g/m<sup>2</sup>) was found in the Scotia Sea, which is situated in a region of high productivity and mass development of Euphausiidae. Quantitative characteristics of the bottom fauna in this area are similar to those in near-continental eutrophic ocean zone. In the Weddell Sea and the Argentine basin, biomass decreases up to 0.85-0.70 g/m<sup>2</sup>, which is close to characteristics of the eutrophic zone of the open ocean. Trawl catches in the studied area were rich and of high diversity. Elapsidid holothurians were dominant. No oligotrophy was found in the abyssal zone and in the extreme south of the Antarctic. (Auth. mod.)



**B-57452**

Sokolova, M.N., **Trophic structure of macrobenthos in abyssal Atlantic Ocean** [Novye dannye o troficheskoi strukture makroobentosa v abissali Atlanticheskogo okeana], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1993, Vol.127, p.50-64, In Russian with English summary. 10 refs.

DLC GC1.A4T.127 1993

In the abysses of the Scotia Sea, Weddell Sea and the Argentine basin, a eutrophic macrobenthic structure typical for nearcontinental regions of the Pacific and Indian oceans, was found. It is characterized by abundance of large invertebrate deposit-feeders whose mass prevails in trawl catches. In this respect the southern nearcontinental region differs from other nearcontinental areas of the Atlantic Ocean, where suspension-feeders prevail. Apart from predominance of the deposit-feeding macrobenthos, the southern nearcontinental region of the Atlantic Ocean is characterized by plurality of carnivorous invertebrates, particularly ophiuroids. The food contents of these ophiuroids consisted of planktonic crustaceans (mainly euphausians), pteropods and small fishes. (Auth. mod.)

**B-57453**

Kuznetsov, A.P., Pasternak, F.A., **Origin of the present bottom fauna in the antarctic ocean** [Antarktika i proiskhozhdenie sovremennoi glubokovodnoi donnoi fauny], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1993, Vol.127, p.65-71, In Russian with English summary. Refs. p.70-71.

DLC GC1.A4T.127 1993

The age, genesis and formation of the present deep-sea oceanic fauna were analyzed, based on current data on the geologic history of the ocean, paleoclimates, and bioevolutionary post-proterozoic reconstructions. Present abyssal oceanic faunas are recognized as relatively young, mainly Cenozoic formations, derivatives of the shallow-water oceanic populations which have acclimatized to the cold-water mode of life before moving into the oceanic abysses. It is concluded that the Antarctic has played a most significant role in the process of the recent (Cenozoic) deep-sea bottom fauna formation. (Auth. mod.)

**B-57454**

Pasternak, F.A., **Coelenterata collected in the South Atlantic Ocean** [Pennatularii, gorgonarii i antipatarii, sobrannye v 43-m reise NIS "Dmitrii Mendeleev" v Argentiskoi kotlovine, Orkeiskom zhelobe i v zapadnoi chasti Afrikansko-Antarkticheskoi kotloviny], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1993, Vol.127, p.82-88, In Russian with English summary. 18 refs.

DLC GC1.A4T.127 1993

This report is based on investigations on deep-sea pennatularians, gorgonarians and antipatharians collected by the R/V *Dmitrii Mendeleev* in the South Atlantic Ocean. *Umbellula thomsoni*, *U. magniflora* and *Distichoptilum gracile* are new records from the Argentine basin and *Primnoella murrayi*, *P. divergens*, *Thouarella longispinosa*, *Th. flabellata*, *Keratois rigidus*, and *Primnois rigidus*, from depths of 3060-4570 m, of the southern part of Scotia Sea. (Auth. mod.)

**B-57455**

Detinova, N.N., **Polychaetous worms of the Orkney trench** [Mnogoshchetinkovye chervi Orkeiskogo zheloba], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1993, Vol.127, p.97-106, In Russian with English summary. Refs. p.105-106.

DLC GC1.A4T.127 1993

Based on analysis of samples collected by the R/V *Dmitrii Mendeleev* in the South Orkney trench in 1989, 20 species of polychaetous worms are identified. The polychaetes are represented mainly by abyssal species, but none is ultraabyssal endemic; 14 occur at great depths of the antarctic abyss, spreading northward, into the Pacific Ocean. It is found that the wide-ranging species of deep-water polychaetes indicate a connection between the antarctic and north Pacific abyssal zones. (Auth. mod.)

**B-57456**

Zevina, G.B., **Scalpellidae (Cirripedia, Thoracica) from the Antarctic** [Abissal'nye vidy skal'pellid (Cirripedia, Thoracica)

Atlanticheskogo sektora Antarktiki], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1993, Vol.127, p.122-128, In Russian with English summary. 8 refs.

DLC GC1.A4T.127 1993

Eleven species of Scalpellidae, one of them n.sp., were identified in the Atlantic sector of the Antarctic. Seven are found to be endemic, 2 occur in the Atlantic and Indian sectors of the Antarctic, 1 occurs in the Atlantic and Pacific sectors, and 1 in antarctic and boreal waters of the Atlantic. The distribution of most species is limited to the abyssal regions, although some species inhabit both bathyal and ultraabyssal zones. The distribution of species is correlated with bottom topography and currents. (Auth. mod.)

**B-57457**

Vinogradov, M.E., Vinogradov, G.M., **Pelagic and benthopelagic gammarides from the Orkney trench** [Zametki o pelagicheskikh i bentopelagicheskikh gammaridakh v Orkneiskom zhelobe], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1993, Vol.127, p.129-133, In Russian with English summary. 18 refs.

DLC GC1.A4T.127 1993

Patterns of geographic distribution and taxonomy of deep-sea benthopelagic and pelagic amphipods-gammarids from the south Orkney trench are discussed. The identity of *Scopelocheirus schellengerbi* Birst. et Vinogr. and *Bathycallisoma pacifica* Dahl is confirmed. (Auth. mod.)

**B-57458**

Kudinova-Pasternak, R.K., **Tanaidacea (Crustacea, Malacostraca) from the South Atlantic and the Weddell Sea** [Tanaidacea (Crustacea, Malacostraca), sobrannye v 43-m reise NIS "Dmitrii Mendeleev" v iugo-zapadnoi Atlantike i more Ueddella], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1993, Vol.127, p.134-146, In Russian with English summary. Refs. p.145-146.

DLC GC1.A4T.127 1993

Based on analysis of Tanaidacea samples collected during the 43rd cruise of the R/V *Dmitrii Mendeleev* in 1989, 23 species were determined, of which 3 are new: *Leptognatioides rectus* n.sp., *Filitanais curticaudus* n.sp., and *Typhlotanais plicatus* n.sp. *Apseudes spinosus* is recorded for the first time in the Southern Hemisphere. Data on the geographic distribution of several species are provided.

**B-57459**

Turpaeva, E.P., **Pycnogonida from the South Atlantic Ocean** [Mnogokolenchatye (Pycnogonida), sobrannye ekspeditsiei NIS "Dmitrii Mendeleev" v iuzhnoi chasti Atlanticheskogo okeana], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1993, Vol.127, p.159-175, In Russian with English summary. Refs. p.174-175.

DLC GC1.A4T.127 1993

The following species, collected during the 43rd cruise of the *Dmitrii Mendeleev* in the South Atlantic Ocean, are described: *Pentanymphe antarcticum* Hodgson, *Nymphon procerum* Hoek, *N. charcoti* Bouvier, *N. compactum* Hoek, *Ascorhynchus inflatum* Stock, *Pantopipetta brevicauda* Stock, *Colossendeis cucurbita* Cole, *C. minor* Schimkewitsch, *C. megalonyx megalonyx* Fry and *Pentapycnon charcoti* Bouvier. Three species are new: *Nymphon filatovae* sp. n., *N. petri* sp. n., and *Colossendeis perforata* sp. n. One specimen, *Pantopipetta gracilis* sp. n., was collected in the Indian Ocean. (Auth. mod.)

**B-57460**

Lus, V.I.A., **Tromina n.sp. (Neogastropoda, Buccinulidae) from the abysses of Lorie and Orkney trenches** [Novyi vid Trominy (Neogastropoda, Buccinulidae, Tromina) iz nizhnei abissali Antarkticheskikh zhelobov Lori i Orkneiskogo], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1993, Vol.127, p.176-197, In Russian with English summary. 10 refs.

DLC GC1.A4T.127 1993

Antarctic abyssal Buccinulidae from the Lorie and Orkney trenches at depths of 5450-5480 and 5063-5470 m is described: *Tromina abyssorum* n.sp. The description of shells, operculums, and the external morphology



and anatomy of the molluscs, are given. Some information about the distribution of all known deep-sea Buccinacea in the abyssal zone of the antarctic ocean is presented. (Auth. mod.)

#### B-57461

Zezina, O.N., **Recent findings of deep-sea brachiopods from the Weddell Sea and the South Orkney trench** [Novye nakhozhdeniia sovremennykh glubokovodnykh brakhiopod v raione moria Ueddella i Orkneiskogo zheloba], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1993, Vol.127, p.198-200, In Russian with English summary. 7 refs.

**DLC GC1.A4T.127 1993**

Numerous shells of the inarticulate brachiopods *Pelagodiscus atlanticus* were collected from the continental slope of the Weddell Sea, at the depth of 2925 m. The grab-sample shows 1020 specimens/sq m, which is the greatest known abundance for the species. From the region of the South Orkney trench *P. atlanticus* and 3 species of articulate brachiopods were collected: *Compsothyris racovitzae*, *Abyssothyris wyvillei* and *Macandrevia (Notorygmia) diamantina*. An empty shell of *C. racovitzae* was found at the depth of 3700-3970 m, which is the maximal depth for the species. (Auth. mod.)

#### B-57462

Beliaev, G.M., Mironov, A.N., **Deep-sea starfishes of the genus Hyphalaster (Porcellanasteridae)** [Glubokovodnye morskije zvezdy roda Hyphalaster (Porcellanasteridae)], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1993, Vol.127, p.205-217, In Russian with English summary. 8 refs.

**DLC GC1.A4T.127 1993**

*Hyphalaster australis* n.sp. from the Antarctic and *H. multispinus* n.sp. from the northwestern part of the Pacific Ocean are described, based on collection of Russian expeditions. Data on new findings and taxonomic remarks are presented for the species *H. inermis*. (Auth.)

#### B-57463

Gebruk, A.V., **New data on elasipodid fauna from the South Atlantic Ocean** [Novye nakhozhdeniia bokonogikh goloturiï v Atlanticheskome sektore Antarktiki i Subantarktiki], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1993, Vol.127, p.228-244, In Russian with English summary. Refs. p.243-244.

**DLC GC1.A4T.127 1993**

A great number of elasipodid holothurians was collected during the antarctic cruise of R/V *Dmitrii Mendeleev* in 1989 in the South Orkney trench and the Weddell Sea. Eleven species of Elpidiidae, 1 of Psychropotidae, 2 of Laetmogonidae, and 1 of Deimatidae are described. There was no new taxa in this material, but previous descriptions of some species were essentially complete, including the strange holothurian *Psychrelepida verrucosa*. This genus links the antarctic to tropical groups of primitive elasipodids. These two regions played an important role in formation of the deep-sea fauna of elasipodid holothurians. Psychrelepida has many common features with Psychropotidae, the closest family to Elpidiidae. Elasipodids play an important role in bottom communities of the Orkney trench and the South Atlantic. Some data on the quantitative distribution of elpidiids in the Orkney trench is proposed. (Auth.)

#### B-57469

Kirkwood, R., Robertson, G., **Foraging ecology of female Emperor Penguins in winter**, *Ecological monographs*, May 1997, 67(2), p.155-176, Refs. p.172-174.

The foraging location, diving behavior, dietary composition, and feeding rates of female Emperor Penguins (*Aptenodytes forsteri*) from the Auster and Taylor Glacier colonies were investigated during the 1993 austral winter. The females occasionally huddled together to minimize heat loss while in transit to the ice edge and between foraging days. The penguins foraged on 93.2% of their days at sea and rested for the remainder. On each foraging day, penguins usually entered the water just after dawn and averaged 4.71 h in the water before exiting at dusk. The hourly dive rate was constant throughout winter, but the daily dive rate increased as day length increased, suggesting that day length is a primary determinant of hunting effort. The stomach contents of 17 females returning to Auster

to brood their chicks were dominated by pelagic prey species: antarctic krill (*Euphausia superba*, 70% by mass) and antarctic silverfish (*Pleuragramma antarcticum*, 13% by mass).

#### B-57475

Scientific Committee on Antarctic Research, **SCAR report No.12, Oct. 1996**, Cambridge, UK, Scott Polar Research Institute, 1996, 46p.

This bulletin consists of 3 reports covering the SCAR Group of Specialists on Environmental Affairs and Conservation (GOSEAC) 5th meeting, in 1994, 6th meeting, in 1995, and 7th meeting, in 1996. The principal issues addressed include environmental impact assessment, environmental monitoring, protected and managed areas, tourism, and reviews of reports on activities of various groups (SCAR, GLOCHANT, CCAMLR, IUCN, ASOC, and COMNAP).

#### B-57477

Green, K., **Biology of the Heard Island Shag *Phalacrocorax nivalis*. 1. Breeding behaviour**, *Emu*, Mar. 1997, 97(1), p.60-66, 13 refs.

The behavior of Heard I. Shags *Phalacrocorax nivalis* was observed in the 1992-93 breeding season. Many of the typical signal patterns of the Pelecaniformes were observed. Despite the isolation of Heard I. Shags from their nearest relatives in the *P. atriceps* grouping the behavior patterns were virtually identical. (Auth.)

#### B-57478

Green, K., **Biology of the Heard Island Shag *Phalacrocorax nivalis*. 2. Breeding**, *Emu*, Mar. 1997, 97(1), p.67-75, 26 refs.

The 1992-93 breeding season of the Heard I. Shag *Phalacrocorax nivalis* was followed through from egg laying to fledging, with measurements made of all eggs, and most chicks, on a five day basis. The start of egg laying of the Heard I. Shag varies widely with the earliest eggs being laid from about mid-Sep. to mid-Oct. The value in such flexibility might come from the opportunity to take advantage of good weather or food availability. The number of chicks raised per pair varied from one to three, with an increase in foraging effort required for more than one chick. Chicks from clutches of three appeared not to be disadvantaged either in when they fledged or in their condition at fledging. There was no significant difference between the mass of C and A chicks at fledging but B chicks were significantly heavier than A chicks. (Auth. mod.)

#### B-57479

Green, K., Williams, R., **Biology of the Heard Island Shag *Phalacrocorax nivalis*. 3. Foraging, diet and diving behaviour**, *Emu*, Mar. 1997, 97(1), p.76-83, 13 refs.

The Heard I. Shag *Phalacrocorax nivalis* feeds mainly on scale worms and fish. The high incidence of scale worms in the diet is unusual for shags; they were taken by all birds in the non-breeding season but in the breeding season those feeding young changed to a diet of fish. The fish were generally small nototheniids that are easy to transfer from adult to young. Diving data for breeding and non-breeding birds did not reveal any differences that could account for the difference in diet. It appears that scale worms are a preferred food item and occur in a similar water depth to that at which the fish were taken. Food selection by adults for their young may be determined by ease of transfer and energy value for volume. Comparisons with results found elsewhere suggest less diving effort by Heard I. Shags, possibly as a result of high food availability in shallow water. (Auth. mod.)

#### B-57488

Blome, D., Schrage, M., **Free-living nematodes from Antarctica. With a description of Simpliconematidae nov. fam. (Trefusiida) and a revision of *Filipjeva* Ditlevsen 1928 (Monhysterida, Xyalidae)** [Freilebende Nematoden aus der Antarktis. Mit einer Beschreibung der Simpliconematidae nov. fam. (Trefusiida) und einer Revision von *Filipjeva* Ditlevsen 1928 (Monhysterida, Xyalidae)], *Bremerhaven, Germany. Institut für Meeresforschung. Veröffentlichungen*, Oct. 1985, 21(1-2), p.71-96, In German with English summary. 26 refs.

**DLC QH91.B7**



A list of genera of free-living marine nematodes from sublittoral mud off the Antarctic Peninsula is presented together with the descriptions of *Simpliconema aenigmatodes* nov. gen. nov. sp., *Filipjeva crucis* nov. sp., and *Chromadorella cobbiana* (Johnston 1938) nov. comb. *S. aenigmatodes* is characterized by three lips, the pharyngeal position of the cervical gland, the position of the orifices of the pharyngeal glands, which are presumably located in the anterior region of the pharynx, and the lack of metanemes. Therefore this new species is assigned to the order Trefusiida. The circular shape of the amphids and the morphology of the male genital system which differ from types generally found in the family Trefusiidae, give reason for establishing a new family Simpliconematidae. The genus *Filipjeva* is revised; *F. arctica* Ditlevsen 1928 and *F. crucis* nov. sp. are considered to represent the only valid species of this genus. *C. cobbiana* (Johnston 1938) nov. comb. is transferred from *Prochromadorella* because of the longitudinally extended lateral differentiation of the coarsely ornamented cuticle, the size of the supplements, and the compact shape of the body. (Auth.)

### B-57489

Londraville, R.L., Storch, J., Sidell, B.D., **Binding site polarity and ligand affinity of homologous fatty acid-binding proteins from animals with different body temperatures**, *Molecular and cellular biochemistry*, June 7, 1996, 159(1), p.39-45, 48 refs.

To investigate FABP's (fatty acid-binding protein) sensitivity to body temperature, fatty acid binding affinity ( $K_d$ ) was determined for both rat heart-FABP and icefish heart-FABP at two physiological temperatures (0°C or 37°C). Saturated and unsaturated fatty acids (16:0 and 16:1), delivered in model membranes (liposomes) whose composition is typical of either antarctic fish (16:0/22:6 phosphatidylcholine) or mammals (bovine-heart phosphatidylcholine) were examined. Incubation at 0°C or 37°C does not significantly affect  $K_d$  for rat heart FABP, regardless of liposome composition or fatty acid ligand. Incubation temperature significantly affects icefish FABP's affinity for 16:1, but not 16:0.  $K_d$  is not significantly different between FABPs under any set of conditions, with one exception. Although  $K_d$  values are largely equivalent between the two FABPs, relative contributions from ionic vs. hydrophobic weak-bond forces are different between the two animals. Rat heart FABP has a binding pocket that is significantly more nonpolar than that of icefish FABP. This suggests that rat-heart FABP realizes a micromolar  $K_d$  with a greater reliance upon hydrophobic interactions than does icefish FABP. (Auth. mod.)

### B-57497

Froneman, P.W., Pakhomov, E.A., Perissinotto, R., Laubscher, R.K., McQuaid, C.D., **Dynamics of the plankton communities of the Lazarev Sea (Southern Ocean) during seasonal ice melt**, *Marine ecology progress series*, Apr. 10, 1997, 149(1-3), p.201-214, Refs. p.212-214.

Size-fractionated primary production and zooplankton grazing impact were estimated along a repeat grid during seasonal ice melt in the southern ocean in the summer of 1994-95. The phytoplankton size composition shifted from a community dominated by nano- and picophytoplankton (<20 µm) during the first grid to one dominated by microphytoplankton (>20 µm) during the second grid. Total areal production during the first grid was generally dominated by nanophytoplankton and ranged between 133 and 356 mg C/m<sup>2</sup>/d. During the second grid survey, total areal production was higher, ranging between 263 and 400 mg C/m<sup>2</sup>/d. Protozoan grazing removed between 0.5 and 31% of the initial phytoplankton stock or between 33 and 94% of the potential phytoplankton production per day during the first grid, and between 0.5 and 8% of the initial phytoplankton stock or between 9 and 25% of the potential phytoplankton production per day during the second grid. (Auth. mod.)

### B-57498

Hanelt, D., Melchersmann, B., Wiencke, C., Nultsch, W., **Effects of high light stress on photosynthesis of polar macroalgae in relation to depth distribution**, *Marine ecology progress series*, Apr. 10, 1997, 149(1-3), p.255-266, Refs. p.264-266.

The capability of several polar macroalgal species to protect photosynthesis against excessive irradiation by dynamic photoinhibition was investigated and related to the specific depth distribution of the species. Photoinhibition of photosynthesis was induced by exposure of the algae to a photon fluence rate of 500 µmol/m<sup>2</sup>/s for 2 h. Changes in the oxygen

production rate and *in vivo* chlorophyll fluorescence were recorded. Significant differences in the reactions during exposure and recovery were found in the different algal classes. Within each class a correlation between species depth distribution and the ability to cope with high light stress was found. Algae growing in nature close to the water surface or in the intertidal were generally not severely stressed. Algae growing in the lower subtidal showed a decrease in the photosynthetic parameters due to high light stress. These experiments indicate that algae already cultured for a long time in the laboratory, retain a certain genetic adaptation to the natural light environment. This is true not only for the lower light limit, but also for the upper light limit. (Auth. mod.)

### B-57499

Slattery, M., McClintock, J.B., Bowser, S.S., **Deposit feeding: a novel mode of nutrition in the Antarctic colonial soft coral *Gersemia antarctica***, *Marine ecology progress series*, Apr. 10, 1997, 149(1-3), p.299-304, Refs. p.303-304.

The colonial nephtheid soft coral *Gersemia antarctica* is a deposit feeder in the soft sediment communities of McMurdo Sound. This feeding strategy involves coordinated binding of the entire colony against the substrate and is previously undescribed among soft corals. Gut content analyses indicate a mixed diet that includes benthic diatoms, foraminiferans, and particulate organic matter. Soft coral colonies move periodically in an 'inch worm' fashion, presumably to exploit undisturbed sediments. In fact, when colonies encounter previously grazed sediment they contract from the substrate almost immediately. This feeding strategy has likely evolved to supplement the capture of planktonic prey and is of particular importance in the Antarctic, and potentially the deep sea, where water column productivity is seasonally constrained. (Auth.)

### B-57509

Beliaev, G.M., Mironov, A.N., **Starfishes *Porcellanaster* and *Caulaster* from the Antarctic** [Glubokovodnye morskije zvezdy rodov *Porcellanaster* i *Caulaster* (Porcellanasteridae) iz Atlanticheskogo okeana i Antarktiki], *Zoologicheskii zhurnal*, 1996, 75(6), p.886-899, In Russian with English summary. 19 refs.

Studying new collections of Porcellanasteridae starfishes from the Atlantic and the Antarctic has allowed to reestablish the genus *Caulaster*. The representatives of this genus were taken previously as juveniles in one of *Porcellanaster* Thomson, 1877 species: *P. ceruleus* Thomson, 1877. Morphology and age variability of the species *C. pedunculatus* Perrier, 1882, *C. eremicus* (Sladen, 1889) and *P. ceruleus* have been redescribed. The genus *Albatrossaster* Ludwig, 1889 is regarded as a junior synonym of *Caulaster*; *A. richardi* Koehler, 1909 is considered as a junior synonym of *C. eremicus*. *Caulaster* from the Antarctic has been registered for the first time. (Auth.)

### B-57515

Antarctic Division, Australian Department of Environment, Sport, and Territories, Dingwell, P., **Marine region 1 antarctic**, Global representative system of marine protected areas, Vol. 1. Edited by G. Kelleher, C. Bleakly, and S. Wells, Washington, D.C., International Bank for Reconstruction and Development/The World Bank, 1995, p.45-59, 22 refs.

### DLC QH91.75.G74G56 1995 Vol.1

The report provides a worldwide inventory of marine protected areas with a significant subtidal component. It documents biogeographic and ecological characteristics by zone in each of the 18 marine regions and summarizes the range of marine biodiversity within each region and the major threats to its conservation. Using a comprehensive selection criteria, including ecological, social and economic factors, it identifies sites of national and regional priority for the conservation of marine biodiversity in each region. These include existing marine protected areas in need of improved management as well as new areas proposed to fill in the gaps in biogeographic representation within the existing marine protected areas system. Volume 1 of this study includes data on the marine protected areas in the Arctic, The Antarctic, Northwest Atlantic, Northeast Atlantic, Baltic, and Mediterranean regions. (Auth. mod.)

### B-57522

Pugh, P.R., Pagès, F., Boorman, B., **Vertical distribution and abundance of the pelagic cnidarians in the eastern Weddell**



**Sea, Antarctica, Marine biological association of the United Kingdom.** *Journal*, May 1997, 77(2), p.341-360, 25 refs.

In total 22 siphonophore and 20 medusan species were identified. Overall siphonophores were more abundant than medusae, but the latter usually contributed much more to the biovolume. On average, cnidarians contributed more than 50% to the total biovolume of each catch; and they contributed >70% to the combined total of all the samples. Despite the high water content of these animals, these large biovolumes meant that the cnidarians formed ca. 25% of the total carbon in each catch. The possible impact of these gelatinous cnidarian populations on the ecosystem is discussed. The vertical distribution of some individual species showed that they occurred over relatively discrete depth ranges, implying that the usage of such general terms as epi-, meso- or bathypelagic could be misleading. Thus the three most common siphonophore species, *Diphyes antarctica*, *Dimophyes arctica* and *Muggiaea bargmannae*, each reached a peak abundance in a different depth range within the 0-500 m depth range, while a fourth, *Crystallophyes amygdalina*, occurred almost exclusively between 400 and 600 m. Even deeper living species occurred within restricted depth ranges. Thus, with one exception in all cases, the medusae *Atolla wyvillei* and *Halicreas minimum*, and the siphonophore *Chunipyces moserae* were found only in the 700-2200, 500-1800 and 1200-2800 m depth ranges respectively. (Auth. mod.)

#### B-57523

Barnes, D.K.A., Peck, L.S., **Antarctic shelf population of the deep-sea Pacific brachiopod *Neorhynchia strebeli***, *Marine biological association of the United Kingdom. Journal*, May (1997), 77(2), p.399-407, 29 refs.

Thirty-five specimens of the articulate brachiopod *Neorhynchia strebeli* were collected from a site at 814 m in the Weddell Sea. This was only the second species of the order Rhynchonellida to be found in Antarctica. Formerly *N. strebeli* was known solely from abyssal Pacific Ocean localities. A circumantarctic distribution is suggested in addition to the known deep-sea Pacific range. The specimens of this collection showed considerable commissure variation, suggesting that the previously proposed erection of two subspecies on the basis of this character is erroneous, and emphasizes the phenotypic plasticity of some articulate brachiopods. The valve lengths and the number of alpha growth rings in the sample showed a normal distribution. If the alpha growth rings were of annual periodicity, the ages attained by the antarctic *N. strebeli* of 11 y would be substantially lower than those reported for other Weddell Sea brachiopods. The epibiotic communities occurring on the valves of *N. strebeli* were impoverished, which is characteristic of deep water antarctic brachiopods. The few specimens collected with their substratum were attached to small pebbles, but the typical attachment substrata may be different. (Auth.)

#### B-57542

Schmidt, M., Botz, R., Stoffers, P., Anders, T., Bohrmann, G., **Oxygen isotopes in marine diatoms: a comparative study of analytical techniques and new results on the isotope composition of recent marine diatoms**, *Geochimica et cosmochimica acta*, June 1997, 61(11), p.2275-2280, 25 refs.

Sediment diatom samples *Ethmodiscus rex* and *Thalassiothrix longissima* from the Antarctic and the North Atlantic Ocean, respectively, show strong  $^{18}\text{O}$  enrichments of 46.8 and 44.1 per mill, which are caused by large isotope fractionation occurring at the low temperature prevailing during silica-water isotope exchange reactions. However, phytoplankton samples from surface waters of the Norwegian-Greenland Sea and the Bellingshausen Sea have  $\delta^{18}\text{O}$  values between 30.4 and 35.0 per mill. Thus, the true silica-water isotopic fractionation is approximately 3 to 10 per mill lower than the temperature-dependent silica-water equilibrium published in the literature for sedimentary diatoms. The authors results indicate that successive isotope exchange reactions of diatomaceous silica with ambient seawater and/or pore water determine the isotope values of diatoms in sediments. (Auth.)

#### B-57547

Roddam, L.F., Rath, A.C., **Isolation and characterization of *Metarhizium anisopliae* and *Beauveria bassiana* from subantarctic Macquarie Island**, *Journal of invertebrate pathology*, May 1997, 69(3), p.285-288, 17 refs.

*Metarhizium anisopliae* and *Beauveria bassiana* have not been recorded in subantarctic regions. Subantarctic isolates may have the capacity to grow and sporulate (and hence infect) more rapidly at lower temperatures than previously characterized isolates. The authors conducted a study of the distribution and abundance of *M. anisopliae* and *B. bassiana* in soils of subantarctic Macquarie I. using techniques similar to those described for Tasmania and examined the temperature-related germination of conidia and growth of colonies, as well as the pathogenicity of the isolates to L3 larvae of *A. couloni*. Details of the study are provided. (Auth. mod.)

#### B-57548

Gardner, H., Kerry, K., Riddle, M., Brouwer, S., Gleeson, L., **Poultry virus infection in antarctic penguins**, *Nature*, May 15, 1997, 387(6630), p.245, 12 refs.

The authors report evidence for the occurrence of an avian pathogen, infectious bursal disease virus (IBDV), in wild antarctic penguins. Samples were collected in Dec. 1995 from the emperor penguin colony at the Auster Rookery and between Sep. 1995 and Feb. 1996 from two colonies within 40 km of Mawson Station. In Jan. 1996 no antibodies were found in chicks or adults at the remote Edmonson Point colony in the Ross Sea. Although clinical disease has not been apparent at this point, it must be assumed that IBVD may be pathogenic in antarctic penguins and is likely to be spread by human activity.

#### B-57549

Berkman, P.A., Nigro, M., **Trace metal concentrations in scallops around Antarctica: extending the mussel watch programme to the southern ocean**, *Marine pollution bulletin*, June 1992, 24(6), p.322-323, 14 refs.

Bivalve molluscs are known to concentrate trace metals in their tissues and have been used extensively for monitoring pollution in coastal marine waters around the world under the design of the Mussel Watch' program. In Antarctica, there are several coastal bivalve mollusc species that meet the criteria of species in the Mussel Watch' program, such as the clam (*Laternula elliptica*) and the scallop (*Adamussium colbecki*). This report presents trace metal concentrations in whole tissues (all tissues combined) of *A. colbecki* from around the continent to begin developing a circumpolar baseline for this species. Trace metal variations in these scallops from Terra Nova Bay, Explorers Cove, and Showa Station are interpreted in relation to their different habitat conditions. (Auth. mod.)

#### B-57554

Arnould, J.P.Y., Duck, C.D., **Cost and benefits of territorial tenure, and factors affecting mating success in male antarctic fur seals**, *Journal of zoology*, Apr. 1997, 241(4), p. 649-664, 48 refs.

The timing, location and duration of territorial tenure, and the mating success and return rates of male antarctic fur seals (*Arctocephalus gazella*) were measured over four consecutive breeding seasons, 1984-87 on Bird I., South Georgia. Tenure duration followed a heavily skewed, Poisson-like distribution and was positively related to the number of years of tenure. Mating success was also biased to a few individuals and was positively correlated to both duration of tenure and the previous number of years in which tenure was achieved. The timing and location of territorial tenure had no measurable effect on mating success. The probability of a male returning to hold a territory in the next year was not related to the number of years tenure that had been achieved or to the level of mating success in the current year. It was, however, positively related to the duration of tenure in the current year. The overall annual return rate was 43% which is not significantly different from the survival rate for the general male population and suggests that territorial tenure does not contribute to increased mortality in male antarctic fur seals. (Auth. mod.)

#### B-57555

Rozbaczylo, N., Canahuire, E., Ojeda, F.P., **Presence of *Microneureis* in antarctic waters and description of a new species, *M. antarctica* (Polychaeta: Nereididae: Notophycinae)**, *Biological Society of Washington. Proceedings*, Dec. 23, 1996, 109(4), p.645-652, 13 refs.

DLCQH1.B4



A new species of Nereididae, *Micronereis antarctica* from the South Shetland Is. and the Palmer Archipelago, is described. The species was collected on the sea-bed from the intertidal zone to 30 m deep. This represents the first record of the genus in antarctic waters. Of the eight known species in this genus, *M. antarctica* is most similar to *M. nanaimoensis* Berkeley & Berkeley, 1953 distributed along the western coast of North America; the two species can be distinguished by morphological differences of the peristomium and mouth, the parapodia and setae, and coloration of integument and eggs. (Auth.)

#### B-57564

Scientific Committee for the Conservation of Antarctic Marine Living Resources, **Report of the Fifteenth Meeting of the Scientific Committee, Hobart, Australia, 21-25 October, 1996**, Hobart, Tasmania, CCAMLR, 1996, 456p., Refs. p.93.

This document presents the adopted record of the Fifteenth Meeting of the Scientific Committee for the Conservation of Antarctic Marine Living Resources held in Hobart, Australia on Oct. 21-25, 1996. Major topics discussed include: the CCAMLR ecosystem monitoring program, krill, fish, crab and squid resources, marine mammal and bird populations, assessment of incidental mortality, ecosystem monitoring and management, management under conditions of uncertainty, new and exploratory fisheries, Scheme of International Scientific Observation, data management and cooperation with other international organizations. Reports of meetings and intersessional activities of subsidiary bodies of the Scientific Committee, including the Working Groups on Ecosystem Monitoring and Management and on Fish Stock Assessment, are appended. (Auth.)

#### B-57565

Commission for the Conservation of Antarctic Marine Living Resources, **Report of the Fifteenth Meeting of the Commission, Hobart, Australia, 21 October-1 November, 1996**, Hobart, Tasmania, CCAMLR, 1996, 164p.

This document presents the adopted record of the Fifteenth Meeting of the Commission for the Conservation of Antarctic Marine Living Resources held in Hobart, Australia on Oct. 21-Nov. 1, 1996. Major topics discussed include: review of the Report of the Scientific Committee, assessment and avoidance of incidental mortality of antarctic marine living resources, new and exploratory fisheries, current operation of the Systems of Inspection and Scientific Observation, interpretation of the Convention, compliance with conservation measures in force, review of existing conservation measures and adoption of new conservation measures, management under conditions of uncertainty and cooperation with other international organizations including the Antarctic Treaty System. The Reports of the Standing Committee on Administration and Finance and the Standing Committee on Observation and Inspection are appended. (Auth.)

#### B-57566

Bitner, M.A., **Encrusters and borers of brachiopods from the La Meseta Formation (Eocene) of Seymour Island, Antarctica**, *Polish polar research*, Dec. 1996, 17(1-2), p.21-28, With Polish summary. Refs. p.26-28.

Epifaunal organisms (bryozoans, foraminifera, serpulid polychaetes, cirripeds, octocorals), scratch marks, and borings (brachiopod pedicle attachment traces, and gastropod, phoronid, sponge and algal boreholes) were recognized on the brachiopod shells from the Eocene La Meseta Formation of Seymour I. They are rare and occur only on about 10% of shells. It is probable that environmental conditions were not suitable for epibionts whose requirements were to be higher than those of brachiopods. The rarity of epifauna on the dead shells can be explained by their rapid burial. (Auth.)

#### B-57572

Pakhomov, E.A., Perissinotto, R., Froneman, P.W., Miller, D.G.M., **Energetics and feeding dynamics of *Euphausia superba* in the South Georgia region during the summer of 1994**, *Journal of plankton research*, Apr. 1997, 19(4), p.399-423, Refs. p.420-423.

Measurements of adult krill (*Euphausia superba*) gut contents, evacuation and egestion rates, as well as digestive efficiency, were carried out during Feb.-Mar. 1994 in the vicinity of South Georgia to estimate *in situ*

daily ration. These were combined with acoustically derived biomass data to calculate the grazing impact of antarctic krill and its contribution to the carbon flux in the region. Individual levels of gut pigment concentrations and evacuation rates ranged from 27 to 1831 ng chlorophyll *a*-eq./ind. and from 0.133 to 0.424/h, respectively. Losses of pigment fluorescence during digestion were very high. Daily carbon consumption estimated using the gut fluorescence method varied from 0.234 to 0.931 mg C/ind./day. Maximum krill grazing impact ranged from 0.4 to 1.9% of the total phytoplankton stock or from 10 to 59% of the total daily primary production. However, grazing impact on the microphytoplankton (>20 µm) was substantially higher, at times exceeding 100% of the daily microphytoplankton production. It is suggested that to meet its energetic demands, krill must consume a substantial proportion of heterotrophic carbon. (Auth. mod.)

#### B-57573

Frazer, T.K., Ross, R.M., Quetin, L.B., Montoya, J.P., **Turnover of carbon and nitrogen during growth of larval krill, *Euphausia superba* Dana: a stable isotope approach**, *Journal of experimental marine biology and ecology*, May 15, 1997, 212(2), p.259-275, Refs. p.274-275.

Using natural abundances of stable isotopes ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ) as tracers, carbon and nitrogen turnover rates were determined for larval krill, *Euphausia superba* Dana, maintained in the laboratory. Experimental populations of larvae were reared at +1.5°C and -1.5°C on foods of known isotopic composition and subsampled weekly (8-10 weeks) for a determination of wet weight and isotopic composition. Metabolic turnover of carbon and nitrogen, manifested as temporal shifts in  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ , was tied closely to temperature. Larval krill reared at +1.5°C had replaced 22-29% of their original body carbon at the conclusion of the experiment, but only 13-22% of their original body nitrogen. Larvae reared at -1.5°C exhibited little evidence of carbon turnover and replaced less than 6% of their original body nitrogen. In addition to the feeding experiments, animals were starved for 2 months at +1.5°C and -1.5°C. Starved krill exhibited little isotopic change. This finding suggests that starvation cannot account for large temporal variations observed in the isotopic composition of larval krill collected from the field. (Auth. mod.)

#### B-57574

Coggan, R., **Seasonal and annual growth rates in the Antarctic fish *Notothenia coriiceps* Richardson**, *Journal of experimental marine biology and ecology*, June 12, 1997, 213(2), p.215-229, Refs. p.227-229.

Growth rates in juvenile *Notothenia coriiceps*, a typical antarctic fish, were measured using mark-recapture techniques and found to be greater when periods of liberty included summer and early autumn months and least when liberty was restricted to winter months. Weight specific growth rates ranged from -0.08-0.26% body weight/day. Year class analysis and cohort analysis were attempted on serial samples of the population but proved ineffective methods for detecting seasonal growth in these slow growing fishes. A tentative description of the seasonal growth profile is proposed. Seasonality in growth indicates that some form of growth limitation is active; competing hypotheses of temperature and resource limitation are discussed. Annual growth rates in 3 year classes showed an inverse relationship with age. Parameters of the Pütter-von Bertalanffy growth equation were estimated. Comparison with other studies show the growth characteristics of *N. coriiceps* differ with geographical location but have not changed substantially at Signy I. over the past 25 years. (Auth.)

#### B-57575

Stanwell-Smith, D., Barnes, D.K.A., **Benthic community development in Antarctica: recruitment and growth on settlement panels at Signy Island**, *Journal of experimental marine biology and ecology*, May 1, 1997, 212(1), p.61-79, Refs. p.77-79.

Identity, quantity and seasonal variation in recruiting invertebrate larvae were investigated at Signy I. Cyclostomatid and cheilostomatid bryozoans, and spirorbinid polychaetes were the dominant colonizing taxa both in terms of numbers and area covered. Very low rates of colonization were observed. Whilst little seasonality of recruitment was observed in spirorbinids, that of cheilostomatid bryozoans showed a significant peak between June and Feb. Successful recruitment levels of colonizing taxa suggested seasonal and interannual variation, although not conclusively.



Measurement of growth of individual bryozoan colonies was assessed by image analysis of the *in situ* monthly photographs. Mean growth ranging between 1.7 mm<sup>2</sup> (*Lacerna eatoni*) and 7.1 mm<sup>2</sup> (*Arachnopusia inchoata*) per month were recorded. There was considerable inter- and intra-specific variation of growth of the encrusting cheilostomatid species investigated and this is the first report of such measurements having been made in Antarctica. (Auth. mod.)

#### B-57583

Starmach, K., **Freshwater algae of the Thala Hills oasis (Enderby Land, East Antarctic)**, *Polish polar research*, 1995, 16(3-4), p.113-148, With Polish summary. Refs. p.145-147.

Some 20 samples of bottom sediments of freshwater lakes collected in the antarctic Thala Hills oasis (Enderby Land) were soaked in laboratory cultures. Eighty-five taxa of algae were identified in these cultures: 54 Cyanophyceae, 1 Chrysophyceae, 10 Xanthophyceae and 20 Chlorophyceae taxa. Most of these taxa are illustrated. (Auth.)

#### B-57584

Błachowiak-Samołyk, K., Żmijewska, M.I., **Horizontal and vertical distribution of Ostracoda in Drake Passage and Bransfield Strait (BIOMASS-SIBEX, December 1983-January 1984)**, *Polish polar research*, 1995, 16(3-4), p.149-161, With Polish summary. Refs. p.160-161.

The material discussed in this paper was collected in the Drake Passage and Bransfield Strait within the framework of the BIOMASS-SIBEX program. Samples were collected by hauling Nansen nets vertically through the 100-0, 300-100 and 500-300 m layers in Dec. 1983 and Jan. 1984. Of the 6 species recorded, *Metaconchoecia isocheira*, *Alacia heteractra*, *Alacia belgicae*, *Metaconchoecia skogsbergi*, *Boroecia antipoda* and *Discoconchoecia aff. elegans*, the first 3, endemic to antarctic waters, were dominant (92.9%). Ostracoda were found most abundantly between Elephant I. and South Orkney Is., and in the southwestern part of Bransfield Strait. Their vertical distribution depended on the hydrological conditions. Ostracoda were most numerous in the 500-300 m and 300-100 m layers; very few were recorded in the 100-0 m surface layer. (Auth.)

#### B-57585

Błachowiak-Samołyk, K., Bielecka, L., Żmijewska, M.I., **Population structure of Chaetognatha in the Atlantic sector of the Southern Ocean (BIOMASS-SIBEX, December 1983-January 1984)**, *Polish polar research*, 1995, 16(3-4), p.163-174, With Polish summary. 19 refs.

Material for this paper was collected during the BIOMASS-SIBEX research program, and consisted of 97 samples taken at 47 stations in the Drake Passage and Bransfield Strait. The samples were taken by hauling Nansen nets vertically through the 0-100, 100-300, and 300-500 m layers at the end of Dec. 1983 and the beginning of Jan. 1984. Four Chaetognatha species were recorded in the study region, *Eukrohnia hamata*, *Sagitta gazellae*, *Sagitta mari* and *Sagitta planctonis*. The population structures of the dominant species, *E. hamata* and *S. gazellae* were analyzed in the context of the region's hydrology. Certain regularities are apparent in the distribution of the developmental stages of *E. hamata* in water column: mature specimens inhabit deeper waters than juveniles. The highest proportions of juveniles in the entire population of *E. hamata* were recorded in slightly warmer waters. (Auth.)

#### B-57586

Gębczyński, A.K., **Is there a hypothermia in Wilson's storm petrel chicks?**, *Polish polar research*, 1995, 16(3-4), p.175-184, With Polish summary. Refs. p.182-183.

Thermoregulation is fully developed in 5 day old Wilson's storm petrels *Oceanites oceanicus* (Kuhl). Resting metabolic rate (RMR) and body temperature (Tb) of unattended 1- and 3-day old chicks continuously decrease at ambient temperature (Ta) of 5°C. After being heated, the chicks return to normothermia. Ability to survive temporal deep hypothermia seems to be an adaptation to absence of parents and low temperatures in the nest during the first days of life. After a snow storm, during two days of starvation, chick-RMR decreases by 40% at Ta of 0°C, but chick-Tb is stable. This suggests a decrease of thermal conductance (Ct). Fall of Ct may suggest beginning of hypothermia. (Auth.)

#### B-57587

Turkiewicz, M., Kalinowska, H., Krystynowicz, A., Kałużewska, M., **Lipolytic activity of Antarctic krill, *Euphausia superba* Dana**, *Polish polar research*, 1995, 16(3-4), p.185-198, With Polish summary. Refs. p.195-197.

Lipolytic activity was determined in samples of antarctic krill frozen in different conditions and in its liquid digesta with synthetic and natural substrates. The lipolytic activity was found to be several-fold higher in the crustaceans with high food intake than in those with an empty digestive tract. Krill lipases show higher activity against esters of unsaturated fatty acids than against analogous derivatives of saturated fats, and 10-fold higher affinity to tributylglycerol. Their maximal activity is at pH 6.4 and 37°C. *E. superba* lipases preserve total activity up to 35°C for 45 minutes, and are completely inactivated at 55°C for 5 minutes. The prevailing location of lipolytic activity is present in krill's cephalothorax; however, extracts from krill's abdomen also display a marked activity. Krill lipases are probably resistant to attacks of the crustacean's proteinases. (Auth. mod.)

#### B-57588

Łukowski, A.B., Bystrzejewska, G., Ligowski, R., **Influence of chlorinated hydrocarbons (Aroclor 1254, pp'DDE, Lindane) on photosynthetic assimilation of <sup>14</sup>C by diatoms *Fragilariopsis curta* and *Fragilariopsis cylindrus***, *Polish polar research*, 1995, 16(3-4), p.199-204, With Polish summary. 9 refs.

The influence of various concentrations (0.002-20 ppm) of chlorinated hydrocarbons (CHs)—Aroclor-1254, pp'DDE and Lindane (HCH)—on photosynthetic assimilation of <sup>14</sup>C by the antarctic phytoplankton community is discussed. The photosynthesis of the dominant diatoms *Fragilariopsis cylindrus* and *F. curta* was considerably inhibited by Aroclor-1254 at concentrations as low as 0.02 ppm. The inhibiting effect on diatom photosynthesis by the pp'DDE occurred at 0.2 ppm. Lindane had the lowest effect, inhibiting diatom photosynthesis only at 20 ppm concentrations. (Auth. mod.)

#### B-57589

Wojciechowska, A., Pisano, E., Zdzitowiecki, K., **Cestodes in fishes at Heard Island (Subantarctic)**, *Polish polar research*, 1995, 16(3-4), p.205-212, With Polish summary. 9 refs.

Thirty-four specimens of bony fishes (5 species) and four specimens of skates (2 species) were examined. Skates were infected with adult representatives of *Phyllobothrium* sp. (Tetraphyllidae) and *Macrobothridium* sp. (Diphyllidae). Bony fishes were infected with three morphological forms of tetraphyllidean cercoids (with mono- and bilocular bothridia, and bothridia undivided with hook-like projections), diphyllbothrid plerocercoids and one pseudophyllidean species, *Bothriocephalus antarcticus* sp.n. This species, as well as two species found in skates, seems to be endemic for the Kerguelen subregion. (Auth.)

#### B-57591

Kawecka, B., Olech, M., Nowogrodzka-Zagórska, M., **Morphological variability of the diatom *Luticola muticopsis* (van Heurck) D.G. Mann in the inland waters of King George Island, South Shetland Islands, Antarctic**, *Polish polar research*, Dec. 1996, 17(3-4), p.143-150, With Polish summary. Refs. p.148-150.

*Luticola muticopsis* is a characteristic species of polar and subpolar regions. Its morphological variability is not yet precisely described. In the investigated population the cells from capitate to shortened, flat rounded tips were observed. The range of dimensions of specimens was 8.8-40.6 µm x 5.5-17.6 µm, striae 11-22/10 µm; this range considerably exceeded that found in holotype diagnosis. (Auth.)

#### B-57592

Kopczyńska, E.E., **Annual study of phytoplankton in Admiralty Bay, King George Island, Antarctica**, *Polish polar research*, Dec. 1996, 17(3-4), p.151-164, With Polish summary. Refs. p.163-164.

A year-round (Mar. 3, 1994-Feb. 28, 1995) phytoplankton study in Admiralty Bay revealed nanoplankton flagellates (<20 µm) to be the major algae of the plankton, both in terms of cell numbers and carbon biomass.



Their quantities fluctuated widely through the year showing several peaks in May, Apr., Dec. and Jan. Summer maximum of the group in Dec. was mainly due to Cryptophyceae ( $4.9 \times 10^6$  cells/l;  $98.0 \mu\text{g C/l}$ ) and Prasino-phyceae ( $7.3 \times 10^5$  cells/l;  $33.5 \mu\text{g C/l}$ ). Diatoms were usually scarce (max.  $6.8 \times 10^5$  cells/l;  $7.82 \mu\text{g C/l}$ ) and were dominated by small species of *Thalassiosira* and by *Nitzschia* spp. (*Pseudonitzschia*); the domination structure somewhat differed from that observed in Admiralty Bay in the summer of 1977-78. Algal peaks were related to the surface water (4 m depth) temperature rise from  $+0.16$  to  $+1.71^\circ\text{C}$ . Summer phytoplankton maxima were about 5-fold greater than those recorded in the summer of 1977-78. (Auth.)

#### B-57593

Olech, M., Alstrup, V., *Dactylospora dobrowolskii* sp. nov. and additions to the flora of lichens and lichenicolous fungi of Bunker Oasis, East Antarctica, *Polish polar research*, Dec. 1996, 17(3-4), p.165-168, With Polish summary. 3 refs.

A lichenicolous fungus, *Dactylospora dobrowolskii* Olech et Alstrup, new to science is described. The paper reports on 9 species of lichens and lichenicolous fungi collected in the Bunker Oasis. (Auth.)

#### B-57594

Stanković, A.M., Rakusa-Suszczewski, S., *Parasitic Protozoa on appendages and inside the body of Euphausia superba* Dana, *Polish polar research*, Dec. 1996, 17(3-4), p.169-171, With Polish summary. 4 refs.

The highest infestation by phoronts (resting stages) of *Apostoma* ciliates forms 1,2, is restricted to the 3-th and 4-th pairs of *E. superba* thoracic limbs. They occur mostly on meropodites of endopodite and plumose setae of exopodite. The trophonts (trophic stage) of those *Apostoma* are present in large numbers in krill's tissue. The life cycle of those histophagous *Apostoma* include also free-living stage—tomit. Swarm formed by krill seems to be a reason for the common and extensive infestation by protozoans. (Auth.)

#### B-57595

Janiec, K., *Comparison of freshwater invertebrates of Spitsbergen (Arctic) and King George Island (Antarctic)*, *Polish polar research*, Dec. 1996, 17(3-4), p.172-202, With Polish summary. Refs. p.198-201.

Nematoda, Tardigrada, Rotifera and Crustacea composition in different freshwater habitats on Spitsbergen (Arctic) and King George I. (Antarctic) is presented. In all surveyed groups more genera and species were recorded from Spitsbergen than from King George I. Habitats richest in taxa were moss banks and thaw ponds, whereas streams were poorest in species. In all groups in both regions cosmopolitan species dominated, but higher number of endemic species was recorded on King George I. Regarding species composition in surveyed groups it can be suggested that freshwater habitats on Spitsbergen are more similar to each other than those on King George I. (Auth.)

#### B-57596

Janiec, K., *Short distance wind transport of microfauna in maritime Antarctic (King George Island, South Shetland Islands)*, *Polish polar research*, Dec. 1996, 17(3-4), p.203-211, With Polish summary. 7 refs.

Traps to catch microfauna transported by wind were installed on a plant-colonized area in the vicinity of a glacier. After 6-weeks 859 individuals of microfauna were caught, of which Nematoda constituted 71%, Tardigrada 22% and Rotifera 7%. The number of microfauna individuals caught depended on the distance from the already colonized areas and the presence of plant parts, which facilitates animal transport. Microfauna connected with vegetation, which is transferred together with plant parts, was transported in higher numbers. Probably these taxa (i.e. *Diphyscon* within tardigrades and Dorylaimidae within nematodes) colonize new habitats at first, but other species dominate later in freshwater bodies. (Auth.)

#### B-57597

Błażewicz, M., Jażdżewski, K., *Contribution to the knowledge of Tanaidacea (Crustacea, Malacostraca) of Admiralty Bay,*

*King George Island, Antarctic, Polish polar research*, Dec. 1996, 17(3-4), p.213-220, With Polish summary. 14 refs.

A collection of 15,283 individuals of tanaidacean crustaceans was gathered by successive Polish Antarctic Expeditions in the years 1977-1993 in Admiralty Bay. Twelve species belonging to three families are identified in this study. The material is clearly dominated by *Nototanais antarcticus* (Hodgson, 1902); other common species were *Nototanais dimorphus* (Beddard, 1886) and *Peraeospinosus* sp. A. The highest density of tanaids was over 140,000 specimens/m<sup>2</sup>, occurring on a muddy bottom in Hervé Cove lagoon. (Auth.)

#### B-57598

Siciński, J., Różycki, O., Kittel, W., *Zoobenthos and zooplankton of Herve Cove, King George Island, South Shetland Islands, Antarctic, Polish polar research*, Dec. 1996, 17(3-4), p.221-238, With Polish summary. Refs. p.235-237.

Hervé Cove, a small, shallow and partly isolated basin, is strongly influenced by glacial freshwater inflow, bringing significant amount of mineral suspension. Its mean annual content amounted up to  $46 \text{ mg/dm}^3$ . Sea anemone (*Edwardsia* sp.), bivalves (*Yoldia eightsi*, *Laternula elliptica* and *Mysella* sp.), amphipods (mostly *Cheirimedon femoratus*) as well as some species of polychaetes constituted almost 95% of zoobenthos biomass and 90% of abundance. Four different assemblages of benthic invertebrates, with total biomass ranging from  $0.002 \text{ kg/m}^2$  up to  $1.7 \text{ kg/m}^2$ , were distinguished. Relatively rich crustacean fauna was encountered in the shallow part of the cover near its entrance. Almost complete lack of echinoderms in Hervé Cove, that are common in the shallow antarctic sublittoral, is noted. Macrozooplankton of Hervé Cove was dominated by Copepoda. The most frequent and abundant species were *Oithona similis*, *Ctenocalanus citer* and *Metridia gerlachei*. Far less numerous Chaetognatha represented by 3 species, Ostracoda, Polychaeta, Pteropoda and Siphonophora constituted only 2.5% of all planktonic animals collected. (Auth. mod.)

#### B-57599

Ciaputa, P., *Numbers of pinnipeds during 1994 in Admiralty Bay, King George Island, South Shetland Islands, Polish polar research*, Dec. 1996, 17(3-4), p.239-244, With Polish summary. 4 refs.

Five species of pinnipeds were counted on the western shore of Admiralty Bay during Feb.-Dec. of 1994. It was found that the numbers of one breeding species, *Mirounga leonina*, is stable. The remaining four species show a variable pattern of occurrence. However, no evidence of any trend since 1988 was detected. (Auth. mod.)

#### B-57600

Morita, Y., Meyer-Rochow, V.B., Uchida, K., *Absolute and spectral sensitivities in dark- and light- adapted Pagothenia borchgrevinki, an Antarctic nototheniid fish, Physiology and behavior*, Feb. 1997, 61(2), p.159-163, 17 refs.

Functional properties of the retina of *Pagothenia borchgrevinki*, an antarctic nototheniid fish that lives beneath the 2.5-3 m thick sea-ice in water of  $-1.8^\circ\text{C}$  temperature, were analyzed electrophysiologically at Scott Base. The waveform of the ERG was monophasic in the dark-adapted state and showed an off-response of opposite polarity in the light-adapted condition. Responses of the light-adapted retina were smaller than those of the dark-adapted eye, although both photopic and scotopic components were observed. Spectral sensitivity measured by monochromatic photostimulation at 14 different wavelengths across the 400-700 nm range showed a single maximum at 490 nm. The spectral sensitivity curve is consistent with a rhodopsin photopigment. It is concluded that the visual system of *P. borchgrevinki* is in tune with the dominant downwelling spectral irradiance and that, due to retinal thermal noise reduction in the cold environment, no great need for particular anatomical adaptations to further enhance sensitivity exists. (Auth. mod.)

#### B-57601

Janes, D.N., *Energetics, growth, and body composition of Adélie penguin chicks, Pygoscelis adeliae, Physiological zoology*, Mar.-Apr. 1997, 70(2), p.237-243, Refs. p.242-243.



The author measured energy use and growth in Adélie penguin chicks, using both field and laboratory techniques. Field metabolic rate was quite variable, but mass-specific rates were not correlated with body mass. Different body organs had similar energy densities, and total body energy density did not vary with chick mass. However, proportional mass of the skin increased rapidly as chicks grew, making the skin an important energy store in larger chicks. Metabolic efficiency measured in the laboratory averaged 69% and did not vary with chick mass. Previous studies of Adélie energetics have focused on adult energy balance and have calculated chick energy requirements indirectly on the basis of adults' stomach loads of krill and frequency of feeding chicks. Values from previous studies do not agree with those from the present study. (Auth. mod.)

#### B-57602

Troncoso, J.S., García, F.J., Backeljau, T., Urgorri, V., **Faunistic and anatomical data on the Antarctic Opisthobranchia (Mollusca, Gastropoda) in the collections of the Royal Belgian Institute of Natural Sciences**, *Bulletin van het Koninklijk Belgisch Instituut voor Natuurwetenschappen. Biologie*, Dec.19, 1996, Vol.66, p.29-40, With French summary. 20 refs.

Five opisthobranch species were collected during the Belgian and Belgian-Dutch Antarctica expeditions to the Riiser-Larsen Sea, the Princess Ragnhild Coast ("Mission Iris") (1960-67) and Admiralty Bay (1987-91). These species include *Philine alata* Thiele, 1912, *Bathyberthella antarctica* Willan & Bertsch, 1987, *Notaeolidia gigas* Eliot, 1905, *Aegires (Anaegires) albus* Thiele, 1912 and *Austrodoris kerguelensis* Bergh, 1884. This material is deposited in the Royal Belgian Institute of Natural Sciences. The present contribution provides anatomical and faunistic data on this collection and distributional range of several species. (Auth.)

#### B-57603

Pugh, P.J.A., **Edaphic oribatid mites (Cryptostigmata: Acarina) associated with an aquatic moss on sub-antarctic South Georgia**, *Pedobiologia*, Apr. 1996, 40(2), p.113-117, 26 refs.

The moss *Drepanocladus uncinatus* (Hedw.) Warnst., from coastal freshwater habitats on the subantarctic island of South Georgia harbors two species of hemi-edaphic oribatid mite namely *Edwardzetes elongatus* Wallwork (Ceratozetidae) and *Trimaloconothrus flagelliformis* Wallwork (Malaconothridae). Both mites feed upon microbiota and tolerate prolonged submersion in freshwater and their survival among the aquatic moss is a result of their pre-adaptation to similar conditions in flooded soil and vegetation, an absence of predators and minimal competition from other aquatic invertebrates. Freshwater habitats on subantarctic islands are relatively young so that, in the future, terrestrial mites may eventually become displaced by more specialist aquatic macrofaunal colonists. (Auth.)

#### B-57606

White, G.J., **Microbial ecology of terrestrial Antarctica: are microbial systems at risk from human activities?**, *Idaho National Engineering Laboratory*, Aug. 1996, INEL-96/0319, 21p., DE96-015372, Refs. p.15-21.

Many of the ecological systems found in continental Antarctica are comprised entirely of microbial species. Concerns have arisen that these microbial systems might be at risk either directly through the actions of humans or indirectly through increased competition from introduced species. This report summarizes the research conducted to date on microbial ecosystems in continental Antarctica and discusses the need for protecting these ecosystems. The focus is on communities inhabiting soil and rock surfaces in non-coastal areas. (Auth.)

#### B-57607

Loeb, V., et al, **Effects of sea-ice extent and krill or salp dominance on the antarctic food web**, *Nature*, June 26, 1997, 387(6636), p.897-900, 30 refs.

Krill (*Euphausia superba*) provide a direct link between primary producers and higher trophic levels in the antarctic marine food web. The pelagic tunicate *Salpa thompsoni* can also be important during spring and summer through the formation of extensive and dense blooms. Although salps are not a major dietary item for antarctic vertebrate predators, their blooms can affect adult krill reproduction and survival of krill larvae. Here the authors provide data from 1995 and 1996 that support hypothesized

relationships between krill, salps and region-wide sea-ice conditions. They have assessed salp consumption as a proportion of net primary production, and found correlations between herbivore densities and integrated chlorophyll-*a* that indicate a degree of competition between krill and salps. Analysis of the relationship between annual sea-ice cover and a longer time series of air temperature measurements shows a decreased frequency of winters with extensive sea-ice development over the last five decades. Data suggest that decreased krill availability may affect the levels of their vertebrate predators. Regional warming and reduced krill abundance therefore affect the marine food web and krill resource management. (Auth. mod.)

#### B-57608

Handrich, Y., et al, **Hypothermia in foraging king penguins**, *Nature*, July 3, 1997, 388(6636), p.64-67, 30 refs.

The ability to dive for long periods increases with body size, but relative to the best human divers, marine birds and mammals of similar or even smaller size are outstanding performers. Penguins (weighing about 12 and 30 kg, respectively) can dive to depths of 304 and 534 m for as long as 7.5 and 15.8 min, respectively. On the basis of their assumed metabolic rates, up to half of the dive durations were believed to exceed the aerobic dive limit. In penguins and many diving mammals, the short surface intervals between dives are not consistent with the recovery times associated with a switch to anaerobic metabolism. The authors show that the abdominal temperature of king penguins may fall to as low as 11°C during sustained deep diving. As these temperatures may be 10 to 20°C below stomach temperature, cold ingested food cannot be the only cause of abdominal cooling. Thus, the slower metabolism of cooler tissues resulting from physiological adjustments associated with diving *per se*, could at least partly explain why penguins and possibly marine mammals can dive for such long durations. (Auth. mod.)

#### B-57609

Weidinger, K., **Variations in growth of Cape petrel *Daption capense* chicks**, *Journal of zoology*, May 1997, 242(1), p.193-207, 50 refs.

This study reports on the growth of Cape petrel chicks at Nelson I. during the breeding seasons 1990-91 and 1991-92. Parameters of logistic growth model fitted to mass, wing, culmen and tarsus measurements were compared between available composite data sets. Differential growth rate of morphometric characters and their proportional development at hatching and fledging conform to the pattern observed in other fulmarine petrels, overall growth rate being among the fastest found in Procellariiformes. Composite growth curves varied significantly between populations, but few annual, seasonal, and intercolony differences were found within the Nelson I. population. Larger eggs produced heavier rather than structurally larger hatchlings, which attained higher peak and fledging mass and size. Strength of the relationship between egg-size and chick measurements initially declined with chick age but, in contrast with results of earlier studies, increased again after around the middle of the chick-rearing period. (Auth. mod.)

#### B-57613

Godlewska, M., **Vertical migrations of krill (*Euphausia superba* Dana)**, *Polskie archiwum hydrobiologii. Polish archives of hydrobiology*, 1996, 43(1), p.9-63, Refs. p.54-63.

Krill migrations occur between sea surface and the depth of about 100 m. The amplitude range from close to 0 to ca. 30 m, being dependent on various biological and abiotic factors. Food availability is one of the most important factors affecting the extent of krill migration. In good feeding conditions the amplitude is maximal, and the migration cycle approaches 24 hours. When food is scarce, the migration cycle is shortened to 12 hours, and the amplitude decreases. Adult individuals have 12-h cycles, lower amplitudes, and their submergence is shallower. Krill migrations show seasonal and annual changes related mainly to food availability expressed as the concentration of chlorophyll *a*. During the day krill clearly avoids shallow depths. A tentative hypothesis is proposed, that krill migration behavior has developed during the last several tens of years as an adaptative form enabling a decrease of mortality caused by surface predators such as seals and birds.

#### B-57614

Beaumont, K.L., Hosie, G.W., **Mesoscale distribution and**



**abundance of four pelagic copepod species in Prydz Bay, *Antarctic science*, June 1997, 9(2), p.121-133, Refs. p.131-133.**

This study analyzes samples of copepods obtained from Prydz Bay using a fine mesh (300 µm) Rectangular Midwater Trawl (RMT1) net during summer 1992-93. Results demonstrate that a net of mesh 4.5 mm used in previous studies underestimates total copepod abundance by a factor of 38. The abundance of the smaller species has been underestimated the most. New estimates of copepod biomass indicate that copepods represent approximately 27% of krill biomass. Copepod and krill distributions are shown to be discrete at 82.4% dissimilarity. Mean temperature accounted for 33.6% of the variation in copepod distribution while two of the species showed a slight correlation with chlorophyll *a* pigment data. These results highlight the numerical importance of copepods and the species' distributions in the East Antarctic marine ecosystem. (Auth. mod.)

#### B-57615

Bowman, J.P., Brown, M.V., Nichols, D.S., **Biodiversity and ecology of bacteria associated with Antarctic sea ice, *Antarctic science*, June 1997, 9(2), p.134-142, 29 refs.**

A total of 135 bacterial strains were isolated from congelation sea ice samples and ice algae biomass samples obtained from the coastal areas of the Vestfold Hills during the summers of 1992-95. The sea ice isolates, along with reference strains, were analyzed by numerical taxonomy and for DNA base composition in order to determine the biodiversity of sea ice bacteria. From these analyses 22 clusters of strains (phena) were obtained with most phena apparently representing novel bacterial taxa. The sea ice isolates could be categorized into three groups based on their ecophysiology: slightly halophilic, psychrophilic bacteria often possessing fastidious growth requirements; halotolerant and psychrotolerant bacteria; and non-halophilic bacteria isolated primarily from upper sections of congelation ice and other ice samples with low levels of algal biomass. (Auth. mod.)

#### B-57618

Upton, M., Pennington, T.H., Haston, W., Forbes, K.J., **Detection of human commensals in the area around an Antarctic research station, *Antarctic science*, June 1997, 9(2), p.156-161, Refs. p.160-161.**

Human contamination of antarctic environments is a sensitive issue and has been the focus of many research articles over the past 35 years. The majority of these studies have targeted waste materials and various hydrocarbons, with assessment of microbial contaminants being largely restricted to sewage outfalls. The present study aimed to detect bacteria of human origin in the area surrounding Halley Station. It was apparent from both molecular and culture methods that bacteria of human origin are extremely difficult to detect outside the immediate surrounding of the buildings, though recommendations are made for increasing the probability of determining the presence of organisms in the environment. The results also indicate that molecular methods are more sensitive than cultural techniques, in that the only evidence for organisms in the environment surrounding the buildings came from positive PCR reactions. PCR would appear to be a useful method for studying the microbial ecology of antarctic environments. (Auth.)

#### B-57619

Wilkinson, I.S., Bester, M.N., **Tag-loss in southern elephant seals, *Mirounga leonina*, at Marion Island, *Antarctic science*, June 1997, 9(2), p.162-167, Refs. p.166-167.**

Rates of tag-loss are determined for Dalton Jumbo Rototags applied to the hind flippers of 4343 (2208 males, 2135 females) southern elephant seal (*Mirounga leonina*) pups at Marion I. over an eight year period from 1983-1990 as part of a demographic study of the species. Loss rates were the lowest recorded to date for this species (range 0.0-9.1%). No significant relationship existed between age and rate of tag-loss, neither was there any sex or year related differences in age-specific tag-loss rates. The low rates of loss highlight the value of tagging as a marking technique, and allow for high levels of confidence in the reliability of the population parameters that are derived from the tagging data collected for the Marion I. population. (Auth.)

#### B-57626

Wynn-Williams, D.D., **Antarctic microbial diversity: the basis of polar ecosystem processes, *Biodiversity and conservation*,**

Nov. 1996, 5(11), p.1271-1293, 129 refs.

Microorganisms are fundamental to the functioning of antarctic ecosystems. Although microbial biomass can be immense in southern ocean blooms and freshwater cyanobacterial mats, species richness is generally more restricted than it is in temperate regions. However, there are representatives of a broad variety of taxa providing a diverse gene pool. Species diversity may be low while metabolic flexibility is high so that a few strains can provide most necessary functions. In this context, biodiversity is the sum of biological potential. This Special Issue highlights aspects of microbial ecology that can be studied only in Antarctica or which are defined most clearly in antarctic habitats. Relatively simple microbial communities, or conspicuous species within them, can be used as indicators of microbial processes and responses to environmental change. These include the palaeoecology record of benthic diatoms and response of soil cyanobacterial communities to regional warming and UV-B stress. The climatic conditions and relict habitats of the antarctic dry valleys are a valuable analogue for detecting microbial life and diversity on Mars. (Auth. mod.)

#### B-57627

Franzmann, P.D., **Examination of antarctic prokaryotic diversity through molecular comparisons, *Biodiversity and conservation*, Nov. 1996, 5(11), p.1295-1305, 58 refs.**

The taxonomy of prokaryotes has been greatly revised and improved due to the refinements afforded by molecular techniques such as 16S rRNA sequencing. Past inventories of antarctic microbial diversity are difficult to reconcile with the developing, phylogenetically-based taxonomy. Antarctic prokaryotes are considerably diverse and most evolutionary groups are represented, including representatives of both Archaea and Bacteria. The diversity appears unique due to the ease with which new species can be isolated; however, that may be a result of the vastly incomplete knowledge of both antarctic and non-antarctic prokaryotic diversity. Use of the 16S rRNA gene as a molecular clock would suggest that the majority of antarctic prokaryotes diverged from their nearest known non-antarctic relatives long before a stable ice-sheet developed in Antarctica. The time of colonization (or recolonization) of antarctic environments by individual species may have been very recent in evolutionary time scales. (Auth. mod.)

#### B-57628

Broady, P.A., **Diversity, distribution and dispersal of antarctic terrestrial algae, *Biodiversity and conservation*, Nov. 1996, 5(11), p.1307-1335, Refs. p.1329-1335.**

Terrestrial algae have been studied at widespread antarctic localities. However, their diversity is not fully known as often collections have not been made from all habitats and techniques have been inadequate for recognition of the total flora. Identifications can be unreliable and are often left at generic level. Despite this it seems that they largely comprise cosmopolitan species but at a reduced diversity relative to other regions. There is a small element of endemic species which, in general, differ only slightly from related species elsewhere. Lack of base-line taxonomic knowledge, detailed characterization of environmental factors, and application of multivariate analysis restricts the ability to define communities and interpret their distribution patterns. Examples are provided where understanding would be greatly improved by more detailed analyses. Dispersal barriers could be operating both to and within Antarctica. However, local dispersal by wind seems readily accomplished. Overcoming dispersal barriers to Antarctica, and between ice-free localities within Antarctica, could present a greater problem. Investigation of long-distance transport of propagules by wind, birds and humans is needed. (Auth.)

#### B-57629

Siebert, J., Hirsch, P., Hoffmann, B., Gliesche, C.G., Peissl, K., Jendrach, M., **Cryptoendolithic microorganisms from antarctic sandstone of Linnaeus Terrace (Asgard Range): diversity, properties and interactions, *Biodiversity and conservation*, Nov. 1996, 5(11), p.1337-1363, 60 refs.**

Cryptoendolithic microorganisms from stratified communities in antarctic sandstone were studied for physiological diversity and possible interactions. Cultures of 25 bacteria, 5 fungi, and green algae from one boulder grew with a wide variety of organic carbon or nitrogen sources; they exhibited varied exoenzymatic activities and were psychrophilic or psychrotrophic. Many isolates excreted vitamins into the medium and



were stimulated by other vitamins. Organic acid excretion and siderophore formation were common, but antibiotic activity was rare. Plasmids were found in 24% of the bacteria, and many of these strains showed resistance to antibiotics and heavy metals. Bacterial cultures in spent algal medium and coculture with algae demonstrated beneficial (rarely inhibitory) interactions. Data presented here indicate low taxonomic but high physiological diversity among these heterotrophic cryptoendoliths. This physiological diversity, as well as the spatial separation in layers with distinct activities, allows coexistence within the community and contributes to the stability of this ecosystem. (Auth. mod.)

#### B-57630

Vishniac, H.S., **Biodiversity of yeasts and filamentous microfungi in terrestrial antarctic systems**, *Biodiversity and conservation*, Nov. 1996, 5(11), p.1365-1378, 84 refs.

Fungal biodiversity in antarctic terrestrial ecosystems increases with the availability of water and energy, but cannot now be precisely described because of problems with identification and questions as to what organisms are truly indigenous. Yeasts probably predominate on continental Antarctica, while other microfungi usually do so in maritime and sub-Antarctica. Lists of nematophagous species and of microfungal species reported from maritime and sub-Antarctica are given. The ecological roles of these fungi are worthy of further research. The ability of common air-spores and pathogens to survive and colonize should be investigated. (Auth.)

#### B-57631

Smith, H.G., **Diversity of antarctic terrestrial protozoa**, *Biodiversity and conservation*, Nov. 1996, 5(11), p.1379-1394, 51 refs.

Heterotrophic protozoa have a global distribution in terrestrial habitats. Their range extends into the antarctic zone, where species diversity is very low owing to dominance of the communities by single, or a few, species which are best adapted to the antarctic terrestrial environment. This is characterized by seasonal, diurnal or unpredictable fluctuations in moisture, temperature and bacterial food supply of high amplitude. Successional changes in community composition in fellfield habitats are characterized by the sequence: pioneer microflagellate colonizers, larger flagellates and small ciliates, and finally testate amoebae. The succession is most closely correlated with the accumulation of organic matter. The occurrence of terrestrial protozoa near their latitudinal limits of distribution can serve as sensitive indicators of the biological effects of climatic change. Having short generation times and effective means of cyst dispersal, changes in the gross distribution can provide rapid warning of critical changes in thermal regimes. (Auth. mod.)

#### B-57632

Ellis-Evans, J.C., **Microbial diversity and function in antarctic freshwater systems**, *Biodiversity and conservation*, Nov. 1996, 5(11), p.1395-1431, Refs. p.1425-1431.

Freshwater lakes occur through much of Antarctica and are characterized by short food chains dominated by microbes. Comparatively few studies have been made of continental freshwater lakes until recently, with the main emphasis being on the less extreme maritime antarctic lakes. The wide range of trophic status seen at the northern extremes of the maritime Antarctic reduces markedly further south, but a wide range of microorganisms occur throughout the latitudinal range. Information on seasonal and spatial patterns of microbial activity for freshwater lakes demonstrate rapid changes in community composition at certain times of year despite constant low temperatures. Benthic communities of cyanobacteria and bacteria are a feature of most lakes and are involved in a wide range of geochemical cycling. There is a need for more detailed taxonomic information on most groups and considerable potential for molecular studies. (Auth.)

#### B-57633

Jones, V.J., **Diversity, distribution and ecology of diatoms from antarctic inland waters**, *Biodiversity and conservation*, Nov. 1996, 5(11), p.1433-1449, 101 refs.

Diatoms are abundant and diverse in many antarctic freshwaters, with a general trend of decreasing diversity moving southwards. They form an important component of many benthic algal communities in streams and standing waters but are generally less common in the phytoplankton. Di-

toms are excellent ecological indicator species and, because their remains are preserved in many sedimentary environments, there appears to be a great potential for palaeoenvironmental reconstruction and the examination of past diversity. A lack of taxonomic precision and consistency, coupled with the insufficient collection from some geographical areas, makes the estimation of the number of antarctic diatom species problematic. (Auth.)

#### B-57634

Vincent, W.F., James, M.R., **Biodiversity in extreme aquatic environments: lakes, ponds, and streams of the Ross Sea sector, Antarctica**, *Biodiversity and conservation*, Nov. 1996, 5(11), p.1451-1471, 54 refs.

The Ross Sea Sector (RSS) of Antarctica lies between 150°E and 150°W and contains diverse landscapes with a variety of lakes, ponds and streams. Neither insects nor crustacean species have been recorded in these ecosystems but most contain planktonic and/or benthic communities composed exclusively of microscopic organisms. Microbial biodiversity is low with a small number of species occurring under a broad range of environmental conditions throughout the region. There is no evidence to date of microbial endemism in the RSS; however, there is a need to apply molecular and cellular techniques to compare biodiversity and genetic characteristics with assemblages elsewhere in Antarctica and with comparable communities in the north polar zone. A series of hypotheses is advanced to help guide further work. These derive from the conclusion that environmental extremes plus biogeographical isolation control the biodiversity of RSS communities, and that biological interactions are weak and play a minor role by comparison with temperate latitude ecosystems. (Auth. mod.)

#### B-57635

Priddle, J., Leakey, R.J.G., Archer, S.D., Murphy, E.J., **Eukaryotic microbiota in the surface waters and sea ice of the southern ocean: aspects of physiology, ecology and biodiversity in a two-phase system**, *Biodiversity and conservation*, Nov. 1996, 5(11), p.1473-1504, Refs. p.1495-1504.

The southern ocean provides a habitat for microplankton which is strongly influenced by physical factors. Of these, one of the most important and striking is the formation of sea ice. Organisms in the ice form a unique community with specific properties and adaptations. Material and organisms are exchanged between the water column and the ice during the annual cycle, and ice is an important factor in modifying biogeochemical processes and exchange between ocean and atmosphere. The coupled system, in which a range of organisms alternate between a fluid and a solid medium, provides an interesting exercise in community ecology, and has implications for the assessment of biodiversity in understanding large-scale change. (Auth.)

#### B-57636

Delille, D., **Biodiversity and function of bacteria in the southern ocean**, *Biodiversity and conservation*, Nov. 1996, 5(11), p.1505-1523, Refs. p.1516-1523.

A short overview of the biodiversity of antarctic marine bacteria is given with respect to morphology and metabolic activity. The importance of spatial and temporal variability is described. The physiological adaptation and ecological function of antarctic marine bacterioplankton are discussed.

#### B-57638

Arpigny, J.L., Lamotte, J., Gerday, C., **Molecular adaptation to cold of an Antarctic bacterial lipase**, *Journal of molecular catalysis B: enzymatic*, June 10, 1997, 3(1-4), p.29-35, 18 refs.

The lipase from the antarctic psychrophilic bacterium *Psychrobacter immobilis* B10 shows a very limited thermal stability when compared to the lipase from a mesophilic strain of *Pseudomonas aeruginosa*. The thermal dependence of its activity is shifted by at least 30°C towards low temperatures and its activation energy is reduced by a factor of 2. The three-dimensional model of the *P. immobilis* lipase reveals several features typical of cold-adapted enzymes: a very low proportion of arginine residues as compared to lysines, a low content in proline residues, a small hydrophobic core, a very small number of salt bridges and of aromatic-aromatic



interactions. All these properties should confer on the enzyme a more flexible structure, in accord with its low activation energy and its low thermal stability. (Auth.)

**B-57639**

Todd, C.M., **Body size, prey size and herbivory in Coleoptera from the sub-Antarctic island of South Georgia**, *Pedobiologia*, Dec. 1996, 40(6), p.557-569, Refs. p.568-569.

Of the 8 species of Coleoptera found on South Georgia, two are endemic herbivores, *Hydromedion sparsutum* and *Perimylops antarcticus* and two are recently introduced carnivores, *Trechisibus antarcticus* and *Oopterus soledadinus*. The size of food particles passing through the guts of these insects was investigated in the larvae and adults of the herbivores and in the adults of the carnivores. Two hypotheses were tested: that body size of the Coleoptera is related to food particle size and that particle size differs with different food items ingested. Overall there were variations in the size of food particles from both plant and animal origins, found in the frass, regurgitant and gut contents of the four species. The range of food particle size was greatest in *T. antarcticus*. Within each species there was no relation between the body size of the insect and the size of food particle. In the herbivores, there were differences in the sizes of food particles from different food items in the frass. (Auth. mod.)

**B-57640**

Chiappe, L.M., **Early avian evolution in the Southern Hemisphere: the fossil record of birds in the Mesozoic of Gondwana**, *Queensland Museum. Memoirs*, Dec. 20, 1996, 39(3), Gondwanan Dinosaur Symposium. Proceedings, edited by F.A. Novas and R.E. Molnar, p.533-555, With Spanish summary. Refs. p.551-555.

The record of Gondwanan Mesozoic birds, including osteological specimens, feathers and traces, is critically reviewed. Data regarding the paleoenvironment and associated biota of each record is provided. Several occurrences of controversial status in the Late Triassic-Early Jurassic of Africa and the Cretaceous of Australia and Africa, and misguided reports from the Cretaceous of South America are also discussed. The Mesozoic record of Gondwanan birds is limited, although it has provided relevant insights about the early evolution of birds. Undisputable records are known from the Cretaceous of South America, Australia, Africa and Antarctica. This material indicates that during the Cretaceous, Gondwanan birds were widely distributed, inhabiting a broad range of environments and developing various modes of life. (Auth.)

**B-57644**

Detrich, H.W., III, **Microtubule assembly in cold-adapted organisms: functional properties and structural adaptations of tubulins from antarctic fishes**, *Comparative biochemistry and physiology*, Nov. 1997, 118A(3), p.501-513, 61 refs.

Fishes native to the coastal waters of the Antarctic have adapted to habitat and body temperatures in the range -1.8 to +2°C. Their cytoplasmic microtubules have evolved to assemble efficiently at these low temperatures. To learn about the underlying molecular adaptations, microtubule proteins and tubulin genes from several antarctic fishes, including the rockcods *Notothenia coriiceps* and *Gobionotothen gibberifrons*, are being studied. Assembly-enhancing adaptations of the fish microtubule proteins are intrinsic to the tubulin subunits themselves. Microtubule formation by antarctic fish tubulins is strongly entropy driven, due in part to an increased reliance, relative to tubulins from other species, on hydrophobic interactions. Based on analyses of tubulin polypeptides and cDNAs, it is suggested that the structural adaptations of antarctic fish tubulins most likely involve alterations in the primary sequences of tubulin isoforms. With respect to neural  $\beta$  tubulins from other vertebrates, for example, the class II  $\beta$ -tubulin isoform of *N. coriiceps* brain contains 7 unique amino acid substitutions and one novel insertion in its 446-residue primary sequence. (Auth. mod.)

**B-57650**

Thor, G., **Mites collected in Heimefrontfjella and Vestfjella (Dronning Maud Land, Antarctica)**, *Fauna Norvegica*, 1996 Series B, 43(2), p.69-73, With Norwegian summary. 24 refs.

During a biological investigation of some nunataks in the mountain ridges Heimefront Range and Kraul Mountains during summer of 1991-92, three mites were collected. Localities for the species, *Eupodes tottanfjella* Strandmann, *Nanorchestes bifurcatus* Strandmann and *Tydeus erebus* Strandmann, and notes on their habitat are given. All three species are reported as new to Sivorgfjella in Heimefront Range and *Tydeus erebus* also as new to the nunatak Basen in the Kraul Mountains. A short description of Heimefront Range and Kraul Mountains as well as a summary of earlier publications on mites from Queen Maud Land are also provided. (Auth. mod.)

**B-57652**

Clarke, A., Leakey, R.J.G., **Seasonal cycle of phytoplankton, macronutrients, and the microbial community in a nearshore antarctic marine ecosystem**, *Limnology and oceanography*, Sep. 1996, 41(6), p.1281-1294, 87 refs.

Seawater chlorophyll *a* concentration and temperature have been measured weekly from Dec. 1988 to Aug. 1994 at a nearshore shallow-water station at Signy I. Macronutrients (N,P,Si) were measured monthly, and the microbial community enumerated during a 15-month period. The duration of winter sea-ice, summer seawater temperature, and peak chlorophyll biomass all exhibited strong interannual variability. The summer peak of microplankton chlorophyll was dominated by large diatoms and colonial forms. Peak concentrations of nanoplankton chlorophyll, predominantly from flagellates, were much lower but the bloom lasted longer and winter biomass was higher than in the microplankton. Seasonal macronutrient patterns suggested a preferential utilization of ammonium at the start of spring followed by a major utilization of nitrate by the summer diatom bloom. The microbial community was complex and showed a clear seasonality in all components, although the timing of the summer bloom differed between taxa. Cell numbers were low in winter, increasing in summer with flagellate taxa especially important in late summer. (Auth. mod.)

**B-57654**

Harloff, J., Mackensen, A., **Recent benthic foraminiferal associations and ecology of the Scotia Sea and Argentine Basin**, *Marine micropaleontology*, June 1997, 31(1/2), p.1-29, 100 refs.

The authors investigated 88 surface sediment samples taken with a multiple corer from the southwestern South Atlantic Ocean for their live and dead benthic foraminiferal content. Using Q-Mode Principal Component Analysis 6 live and 6 dead associations are differentiated. Live and dead association distributions correspond fairly well; differences are mainly caused by downslope transport and selective test destruction. In addition, 4 potential fossil associations are calculated from the dead data set after removal of non-fossilizable species. These potential fossil associations are expected to be useful for paleoceanographic reconstructions. Environments are described in detail for the live and potential fossil associations and for selected species. Three associations of mainly agglutinated foraminifera occur in sediments bathed mainly by AABW or CDW. A *Reophax difflugiformis* association was found in mud-rich and diatomaceous sediments. Below the CCD, a *Psammosphaera fusca* association occurs in coarse sediments poor in organic carbon while a *Cribratoides subglobosus*-*Ammobaculites agglutinans* association covers a more variable environmental range with mud contents exceeding 30%. (Auth. mod.)

**B-57661**

McGlone, M.S., Moar, N.T., **Pollen-vegetation relationships on the subantarctic Auckland Islands, New Zealand**, *Review of palaeobotany and palynology*, May 1997, 96(3-4), p.317-338, 31 refs.

A modern pollen-vegetation cover data set of 51 sites from the Auckland Is. is presented. With increasing altitude low scrub and shrubland-grassland predominate and, above 300 m altitude, tussock grassland and fellfield. Tall, wind-pollinated species do not occur on the island, and pollen deposition is thus largely local. The broad vegetation communities are clearly recognizable by detrended correspondence analysis (DCA) of the pollen data. Pollen types derived from Australia and the New Zealand mainland are consistently represented in the pollen rain, averaging 0.9% and not exceeding 5%. Comparison by DCA of fossil samples from a Holocene peat core with the modern data set demonstrate a close resemblance between modern and fossil samples. This survey shows that when



tall wind-pollinated trees are excluded, low-growing vegetation with poorly dispersed pollen can be accurately characterized by its pollen rain. (Auth. mod.)

#### B-57666

Reinhardt, K., **Food and feeding of antarctic skua chicks** [Nahrung und Fütterung der Küken antarktischer Raubmöwen *Catharacta antarctica lonnbergi* und *C. maccormicki*], *Journal für Ornithologie*, 1997, Vol.138, p.199-213, In German with English summary. Refs. p.212-213.

In the austral summers 1993-94 and 1994-95, 54 chicks of *Catharacta antarctica lonnbergi*, *C. maccormicki*, as well as mixed pairs of both forms, were ligatured in order to get quantitative results of food composition and consumption. In total, 2992 g of food was obtained from Brown Skua chicks, 730 g from South Polar Skua chicks, and 214 g from mixed pair chicks. The food composition varied between the forms. For the two years investigated, there was no diet variation in the South Polar Skua and the mixed pairs. Brown Skua chicks received 80% penguin components, including digested krill from penguin stomachs, and 12% of station garbage. Three percent were of marine origin. South Polar Skua chicks, in contrast, received 83-87% fish, 3-13% crustaceans, including krill, and no garbage. Mixed pair chicks got 73-80% fish and 17-20% penguin meat. (Auth. mod.)

#### B-57667

Cohen, B.L., et al, **Enigmatic phylogeny of skuas (Aves: Stercorariidae)**, *Royal Society of London. Proceedings. Series B*, 1997, Vol.264, p.181-190, Refs. p.188-190.

Multiple sources of evidence show that the skuas are a monophyletic group, closely related to gulls. On morphological and behavioral evidence, the Stercorariidae are divided into two widely divergent genera, *Catharacta* and *Stercorarius*, consistent with observed levels of nuclear and mitochondrial gene divergence. *Catharacta* skuas are large-bodied and with one exception breed in the Southern Hemisphere. *Stercorarius* skuas are smaller bodied and breed exclusively in the Northern Hemisphere. Evidence from both mitochondrial and nuclear genomes and from ectoparasitic lice shows that the Pomarine skua, *S. pomarinus*, which has been recognized as being somewhat intermediate in certain morphological and behavioral characteristics, is much more closely related to species in the genus *Catharacta*. (Auth. mod.)

#### B-57668

Gómez, I., Wiencke, C., **Seasonal growth and photosynthetic performance of the antarctic macroalga *Desmarestia menziesii* (Phaeophyceae) cultivated under fluctuating antarctic day-lengths**, *Botanica acta*, Feb. 1997, Vol.110, p.25-31, Refs. p.30-31.

Growth, photosynthesis, dark respiration and pigment contents were monitored in adult sporophytes of the brown alga *Desmarestia menziesii* J. Agardh grown under fluctuating antarctic daylength conditions. Growth rates were closely coupled to daylength variations with values varying from 0.05%/d in winter condition to 0.5%/d in early summer. Photosynthetic pigments had maximum values of 1.8 mg/g FW (chlorophyll *a*), 0.4 mg/g FW (chlorophyll *c*) and 0.9 mg/g FW (Fucoxanthin) in summer. These changes were also closely related to individual size and biomass of the plants. Dark respiration was high in spring approximately coinciding with growth peaks. Likewise, photosynthetic efficiency ( $\alpha$ ) and the initial saturating light point of photosynthesis ( $I_k$ ) increased significantly in spring. These results are the first that demonstrate seasonality of physiological parameters in *D. menziesii* sporophytes and confirm that phenology and physiology of macroalgae can be simulated in the laboratory. (Auth. mod.)

#### B-57669

Dózsa-Farkas, K., Convey, P., ***Christensenia*, a new terrestrial enchytraeid genus from Antarctica**, *Polar biology*, June 1997, 17(6), p.482-486, 9 refs.

*Christensenia* n. gen., *C. blocki* n. sp. is described from Signy I. The new species is identical with specimens that Stephenson (1932) determined as *Marionina georgiana* (Michaelsen, 1888), but differs from the type material of *M. georgiana*. The species *M. georgiana* is also placed in the new genus *Christensenia*, the main characteristics of which are: pos-

session of sigmoid setae, and the presence of large numbers of small, hyaline, stick-like, anucleate lymphocytes. No other types of lymphocyte are observed. Oesophageal appendages and intestinal diverticulae are absent. Dorsal vessel originates in the clitellar region; blood is colorless. The anteseptal part of the nephridium consists of the funnel and a few canals, with the efferent duct arising postero-ventrally. Spermathecae are without diverticulate, entally connecting with the oesophagus. The known distribution of the genus is currently limited to terrestrial habitats in the sub- and maritime Antarctic. (Auth.)

#### B-57670

Van de Vijver, B., Beyens, L., **Epiphytic diatom flora of mosses from Strømness Bay area, South Georgia**, *Polar biology*, June 1997, 17(6), p.492-501, Refs. p.499-500.

A total of 104 taxa, belonging to 27 genera, were recorded from 36 moss samples collected in the Strømness Bay area. Cluster analysis revealed two groups of samples. Group 1 consisted of the *Achnanthes incognita-Fragilaria germainii* assemblage and the *Eunotia paludosa* var. *paludosa* assemblage. Group 2 included the *Pinnularia borealis* assemblage. The major ecological factor dividing the two groups appears to be the moisture content of the samples. Group 1 represents wetter conditions, and the second group is found on very dry mosses. The assemblages of group 1 were separated from each other by pH. The *A. incognita-Fragilaria germainii* assemblage occurs in wet mosses with a circumneutral pH. The *E. paludosa* var. *paludosa* assemblage prefers bryophyte habitats with low pH values. The size of *P. borealis* drops significantly according to the dryness of the moss habitat. (Auth.)

#### B-57671

Parapar, J., San Martín, G., **"Sedentary" polychaetes of the Livingston Island shelf (South Shetlands, Antarctica), with the description of new species**, *Polar biology*, June 1997, 17(6), p.502-514, Refs. p.513-514.

The taxonomic results of examining the "sedentary" families of polychaetes collected during the Spanish cruise "Bentart 94" off Livingston I. are presented. Most of the identified species are endemic to antarctic and subantarctic areas, but some cosmopolitan species are also present. A total of 4,022 specimens have been examined, belonging to 44 species, 42 genera and 15 families. Maldanidae and Terebellidae were the most important families in number of species, and *Asychis amphiglypta*, *Maldane sarsi antarctica* and *Amphitrite kerguelensis* in number of individuals. *Melinna arnaudi*, a new species belonging to the family Ampharetidae, is described, and *Phisia rubrolineata* and *Aricidea (Allia) oculata* are recorded for the first time since their original description. (Auth.)

#### B-57672

Froneman, P.W., Pakhomov, E.A., Laubscher, R.K., **Microphytoplankton assemblages in the waters surrounding South Georgia, Antarctica during austral summer 1994**, *Polar biology*, June 1997, 17(6), p.515-522, Refs. p.521-522.

In Jan.-Feb. 1994, microphytoplankton distribution was studied at 83 stations along a zig-zag transect in the waters surrounding South Georgia. The two most widely distributed species were *Corethron criophilum* and *Eucampia antarctica*, which were recorded at all stations sampled. Also well-represented amongst the microphytoplankton assemblages were temperate, neritic species such as *Chaetoceros atlanticus*, *Proboscia alata* and *Odontella weissflogii*. This can probably be related to the intrusion of subantarctic surface waters unusually far south. Cluster and ordination analysis identified three distinct groupings of stations in the waters surrounding the islands. These were found to the east, west and north of the islands. The diatom groupings identified during this investigation broadly correspond to three water masses previously described in the vicinity of South Georgia. (Auth. mod.)

#### B-57675

Hong, Y., Smith, W.O., Jr., White, A.M., **Studies on transparent exopolymer particles (TEP) produced in the Ross Sea (Antarctica) and by *Phaeocystis antarctica* (Prymnesiophyceae)**, *Journal of phycology*, June 1997, 33(3), p.368-376, Refs. p.375-376.



The distribution and production of transparent exopolymer particles (TEPs) were studied quantitatively both in cultures of *Phaeocystis antarctica* Karsten (Prymnesiophyceae) and in natural phytoplankton assemblages in the Ross Sea. TEP production in culture was a function of growth rate and photosynthetic activity and was strongly influenced by photon flux density. The concentrations of TEP measured during a bloom, dominated by *P. antarctica*, were higher than those produced by coastal diatom blooms and were correlated with chlorophyll *a* (Chl *a*). TEP concentrations (both absolute and relative to Chl *a*) increased as the bloom's biomass increased. Vertical distributions of TEP and Chl *a* showed TEP: chlorophyll maxima at the bottom of the water column at most stations. Because TEP and floc formation are tightly coupled, it is suggested that mucous flocs derived from TEP, rather than intact *P. antarctica* colonies, are the dominant component of aggregates and subsequent organic carbon vertical flux. (Auth. mod.)

#### B-57677

Marshall, W.A., **Seasonality in Antarctic airborne fungal spores**, *Applied and environmental microbiology*, June 1997, 63(6), p.2240-2245, 36 refs.

Airborne fungal spores were monitored over periods of up to 13½ months at 3 sites on Signy I. Fungal spore concentrations in the air were much lower than in other parts of the world; they were very low during the winter but increased during the summer. Chlamydospores were the most abundant fungal spore type found. Spores of *Cladosporium* spp. were the second most frequently trapped form. All spore types samples were most abundant in the summer months, except for chlamydospores, which were most numerous during the winter. *Cladosporium* loses its dominance as the most abundant component of the air spora with increasingly high latitude. The peak concentration of fungal spores occurred at 2 sites following the start of the thaw; at the third site, the peak occurred with the arrival of spores by long-distance transport from more northerly regions. (Auth. mod.)

#### B-57678

Broady, P.A., Ohtani, S., Ingerfeld, M., **Comparison of strains of *Xanthonema* (=Heterothrix, Tribonematales, Xanthophyceae) from Antarctica, Europe, and New Zealand**, *Phycologia*, Mar. 1997, 36(2), p.164-171, 28 refs.

Seventeen strains of *Xanthonema* Silva (Tribonematales, Xanthophyceae) are examined by light microscopy and transmission electron microscopy, and their salinity tolerance is investigated. Ten strains are from Antarctica where the genus is poorly known. These strains are compared with 2 strains from New Zealand and 5 from Europe. Stalk-like chloroplast lobes resembling pyrenoids are described for the first time for *Xanthonema*. *Xanthonema sessile* (Vinatzer) Ettl et Gärtner and *X. hormidioides* (Vischer) Silva are new records for Antarctica. Other antarctic strains resemble 7 other species; difficulties in making confident identifications are discussed. Three of the strains were unable to tolerate salinity greater than 10 ppt, but 2 strains tolerated salinity as high as 35 ppt. Seven of the antarctic strains closely resemble species known from Europe. The remaining 3 antarctic strains have features previously undescribed in *Xanthonema*. (Auth. mod.)

#### B-57679

Slip, D.J., Woods, R., **Intramuscular and intravenous immobilization of juvenile southern elephant seals**, *Journal of wildlife management*, Oct. 1996, 60(4), p.802-807, 27 refs.

This study was made to determine the most appropriate method for immobilizing seals to a level required for stomach flushing or attaching electronic activity recorders. With intravenous injections, time to induction was shorter ( $P<0.001$ ) and less variable ( $P<0.001$ ), the duration of immobilization was shorter ( $P<0.001$ ) and less variable ( $P<0.003$ ), and dose of ketamine was lower ( $P<0.001$ ) and less variable ( $P<0.001$ ). Eight of 32 seals (25%) injected intravenously had apneas ranging from 8 to 20 minutes (mean=16±4.5 min), and 6 of 27 seals (22%) injected intramuscularly were apneic for more than 5 minutes. Seals that became apneic after intravenous injection began breathing before the theoretical aerobic dive limit was reached. (Auth. mod.)

#### B-57680

Miller, W.R., Horning, D.S., Dastyh, H., **Tardigrades of the**

**Australian Antarctic: description of two new species from Macquarie Island, Subantarctica, Hamburg**, *Zoologisches Museum. Entomologische Mitteilungen*, Oct. 15, 1995, 11(152), p.231-239, With German summary. 13 refs.

Two new species of tardigrades, *Echiniscus darienae* sp. n. and *Ramajendas heatwolei* sp. n., are described from samples collected during the 1977-78 Australian Museum Expedition to Macquarie Island in the Subantarctic. (Auth.)

#### B-57682

Dastyh, H., Harris, J.M., **New species of the genus *Macrobiotus* from inland nunataks in western Dronning Maud Land, continental Antarctica (Tardigrada)**, *Hamburg. Zoologisches Museum. Entomologische Mitteilungen*, July 31, 1995, 11(151), p.175-182, With German summary. 14 refs.

A new tardigrade, *Macrobiotus krynauwi* sp. n. is described in terms of holotype, type locality, paratypes, diagnosis, and description. Extended descriptions are given of various body parts, including the mouth, pharynx, claws and eggs. The new species is dedicated to Dr. Johan R. Krynauw of South Africa.

#### B-57685

Malloy, K.D., Holman, M.A., Mitchell, D., Detrich, H.W., III, **Solar UVB-induced DNA damage and photoenzymatic DNA repair in antarctic zooplankton**, *National Academy of Sciences of the United States of America. Proceedings*, Feb. 18, 1997, 94(4), p.1258-1263, 54 refs.

The detrimental effects of elevated intensities of mid-UV radiation (UVB) have been well documented. Natural populations of antarctic zooplankton also sustain significant DNA damage, measured as cyclobutane pyrimidine dimers (CPDs), during periods of increased UVB flux. Although repair rates were large for all species evaluated, they were apparently inadequate to prevent the transient accumulation of substantial CPD burdens. The capacity for DNA repair in antarctic organisms was highest in those species whose early life history stages occupy the water column during periods of ozone depletion and lowest in fish species whose eggs and larvae are abundant during winter. Although the potential reduction in fitness of antarctic zooplankton resulting from DNA damage is unknown, the authors suggest that increased solar UV may reduce recruitment and adversely affect trophic transfer of productivity by affecting heterotrophic species as well as primary producers. (Auth. mod.)

#### B-57689

Chen, L., DeVries, A.L., Cheng, C.H.C., **Evolution of antifreeze glycoprotein gene from a trypsinogen gene in antarctic nototheniid fish**, *National Academy of Sciences of the United States of America. Proceedings*, Apr. 15, 1997, 94(8), p.3811-3816, 30 refs.

The antifreeze glycoproteins (AFGPs) of the predominant antarctic fish taxon, the notothenioids, evolved from a pancreatic trypsinogen. The authors have determined the likely evolutionary process by which this occurred through characterization and analyses of nototheniid AFGP and trypsinogen genes. The nototheniid trypsinogen to AFGP conversion is the first clear example of how an old protein gene spawned a new gene for an entirely new protein with a new function. It also represents a rare instance in which protein evolution, organismal adaptation, and environmental conditions can be linked directly. The sequence of events and the biochemical transformations leading to the creation of a new antifreeze protein are set forth and the time frame for it to appear and become effective in the antarctic ecology is deduced. (Auth. mod.)

#### B-57690

Chen, L., DeVries, A.L., Cheng, C.H.C., **Convergent evolution of antifreeze glycoproteins in antarctic nototheniid fish and Arctic cod**, *National Academy of Sciences of the United States of America. Proceedings*, Apr. 15, 1997, 94(8), p.3817-3822, 37 refs.

Antarctic nototheniid fishes and several northern cods are in different orders and superorders, yet produce near-identical antifreeze glycoproteins (AFGPs) to survive in their respective freezing environments. AFGPs in both fishes are made as a family of discretely sized polymers



composed of a simple glycotripeptide monomeric repeat. Characterizations of the AFGP genes from notothenioids and the arctic cod show that their AFGPs are both encoded by a family of polypeptide genes, with each gene encoding multiple AFGP molecules linked in tandem by small cleavable spacers. Despite these apparent similarities, detailed analyses of the AFGP gene sequences and substructures provide strong evidence that AFGPs in these two polar fishes in fact evolved independently. The molecular evidence for separate ancestry is supported by morphological, paleontological, and paleoclimatic evidence, which collectively indicate that these two polar fishes evolved their respective AFGPs separately and thus arrived at the same AFGPs through convergent evolution. (Auth. mod.)

#### B-57706

Olsson, O., North, A.W., **Diet of the King Penguin *Aptenodytes patagonicus* during three summers at South Georgia**, *Ibis*, July 1997, 139(3), p.504-512, Refs. p.511-512.

King Penguins *Aptenodytes patagonicus* which were rearing chicks were studied during 3 summers, from Nov. 1991 to Mar. 1994 at South Georgia. Stomach samples collected by flushing had a mean mass of 1308 g. Fish mass was allocated to each species based on the relationship between fish mass and otolith length. Three mesopelagic lanternfishes (Myctophidae), *Krefftichthys anderssoni*, *Electrona carlsbergi* and *Protomyctophum choriodon*, dominated the diet both by numbers and mass. They were small fish with mean mass of 3-7 g. Overall, *K. anderssoni* dominated the diet in terms of numbers and mass. Squid represented <3% of the diet by mass. Although the chick-rearing success was poor in the 1993-94 summer, meal size was not reduced, but foraging trips were longer. It is concluded that myctophid fish, especially *K. anderssoni*, are the main summer prey of King Penguins rearing chicks at South Georgia, as found in other recent studies in the southern ocean. (Auth. mod.)

#### B-57707

Spear, L.B., Ainley, D.G., **Flight behaviour of seabirds in relation to wind direction and wing morphology**, *Ibis*, Apr. 1997, 139(2), p.221-233, Refs. p.227-229.

The authors studied flight direction relative to wind direction, the relation between wing morphology and flight behavior and interspecies relationships in flight behavior among all major seabird taxa. They calculated wing loading and aspect ratios for 98 species from 1029 specimens. Species were sorted into 13 groups on the basis of similarity in patterns of flight direction. The primary flight direction of Pelecaniformes and Charadriiformes was into and across headwinds. The most common flight direction of Procellariiformes was across wind. Seabirds avoided flying with tailwinds. Arctic Terns migrating in the Antarctic flew mostly into headwinds (a flight direction similar to that of terns and skuas observed over a much wider geographic range) and foraged along the migration route. This finding suggests that headwind flight is acceptable or even preferred during migration. Results demonstrate a close link in seabirds between flight behavior and wing morphology. (Auth. mod.)

#### B-57708

Spear, L.B., Ainley, D.G., **Flight speed of seabirds in relation to wind speed and direction**, *Ibis*, Apr. 1997, 139(2), p.234-251, 37 refs.

The authors studied flight speed among all major seabird taxa, including Antarctic Petrels. The objectives were to provide further insight into dynamics of seabird flight and to develop allometric equations relating ground speed to wind speed and direction for use in adjusting seabird density estimates (calculated from surveys at sea) for the effect of bird movement. They used triangulation at sea to estimate ground speeds of 1562 individuals of 98 species. Species sorted into 25 "groups" based on similarity in ground speeds and taxonomy. After they were controlled for differences in ground speed, the 25 groups sorted into 8 major "types" on the basis of response to wind speed and wind direction. Wind speed and direction explained 16-64% of the variation in ground speed among seabird types. Tailwind speed had little effect on air speed of gliders (albatrosses and large gadfly petrels). All species increased air speeds significantly with increased headwinds. (Auth. mod.)

#### B-57709

Foggo, M.N., Hitchmough, R.A., Daugherty, C.H., **Systematic**

**and conservation implications of geographic variation in pipits (*Anthus*: Motacillidae) in New Zealand and some offshore islands**, *Ibis*, Apr. 1997, 139(2), p.366-373, Refs. p.371-373.

The New Zealand Pipit *Anthus novaeseelandiae* occurs as a single species in Europe. In the New Zealand region, subspecific status has been accorded to allopatric populations on the mainland (*A. n. novaeseelandiae*), and on the Auckland and Campbell islands (*A. n. aucklandicus*). Analyses of allozyme loci and morphometric variation of populations on mainland New Zealand and on the Auckland and Campbell islands showed an appreciable and significant divergence between mainland and island populations. The magnitude of the allozyme difference is sufficient to suggest full species designation for the island birds, a conclusion supported by morphometric analyses and in sharp contrast to current taxonomy. (Auth. mod.)

#### B-57710

Georges, J.Y., Guinet, C., Jouventin, P., Weimerskirch, H., **Satellite tracking of seabirds: interpretation of activity pattern from the frequency of satellite locations**, *Ibis*, Apr. 1997, 139(2), p.403-405, 9 refs.

The ARGOS system provides accurate information on large-scale migratory and foraging movements of wild birds and mammals. Foraging strategies have been studied via satellite telemetry in several seabirds. However, the ARGOS system may not be adequate for predicting the diving behavior of seabirds like penguins because observed gaps in fixes may be a direct consequence of less frequent satellite passes at certain times of the day. In this paper, the authors investigate this question using data on the satellite pass calendar, which corresponds to the times and dates when the satellites passed overhead, and ARGOS data on diving and non-diving seabirds for a better interpretation of their foraging activity in relation to the distribution in time of the satellite passes.

#### B-57719

Konovalov, B.V., **Phytoplankton pigment composition in the Scotia Sea in Dec. 1985** [Pigmentnyi sostav fitoplanktona v more Skosha v dekabre 1985 g.], *Antarktika*, 1995, No.33, p.55-62, In Russian with English summary. 16 refs.

The concentration of photosynthetic chlorophyll *a*, phaeophytin *a*, carotenoids, and the pigment index were measured, together with the total solar radiation and specific water transparency at 43 stations in an area to the north of Elephant I. There was considerable variation in the vertical distribution profiles. A comparison with other materials showed that there were also great variations from year to year in the distribution of chlorophyll and the calculated primary production for a given season. (Auth. mod.)

#### B-57720

Zernova, V.V., **Phytoplankton of Elephant I. in Dec. 1985** [Fitoplankton u ostrova Mordvinova v dekabre 1985 g. (atlanticheskii sektor Iuzhnogo okeana)], *Antarktika*, 1995, No.33, p.63-78, In Russian with English summary. 27 refs.

During cruise 43 of R.V. *Akademic Kurchatov* in an area to the north of Elephant I. phytoplankton was collected using a bottle sampler. In the pre-spring period the crop of phytoplankton was medium high. Within this area the greatest concentrations of phytoplankton were in a band stretching from S-E to N-W which coincided with the Second Frontal Zone, and also in the shallower waters near the island. To the north and west of the polygon the spring phytoplankton bloom had already begun. Preliminary estimates showed that the spring phytoplankton maximum which was moving from N to S at a speed of 12 miles/day would reach the area on Dec. 20. There was considerable variation in the index of species diversity reflecting the extremely complex phytoplankton ecology of early spring. (Auth. mod.)

#### B-57721

Makarov, R.R., **Abundance and stage composition of swarms of copepod and euphausiid larvae in antarctic coastal waters** [Nekotorye dannye o chislennosti i vozrastnom sostave massovykh kopepod i lichinok evfauziid v pribrezhnykh vodakh Antarktity], *Antarktika*, 1995, No.33, p.88-106, In Russian with English summary. 22 refs.



The abundance and stage composition of plankton samples collected between Dec. 1988 and Apr. 1989 in the inshore waters of Antarctica were studied. Species included *Calanoides acutus*, *Calanus propinquus*, *Rhincalanus gigas* and *Euphausia superba*, *E. crystallorophias*, *E. frigida* and *Thysanoessa macrura*. Differences in the seasonal development of the populations of these species were found to depend on latitude and distance from the shore. The relationship between latitude, seasonal succession of a species and distance from the shore may be either simple or inverted. Inverted relationships result from the development of "oasis" conditions, to which each species reacts differently. (Auth. mod.)

### B-57722

Men'shenina, L.L., **Seasonal dynamics of abundant species of copepods in Admiralty Bay** [Sezonnaia dinamika massovykh veslonogikh rakoobraznykh v zalive Admiralteystva (o-v King-Dzhordzh, Iuzhnye Shetlandskie ostrova)], *Antarktika*, 1995, No.33, p.107-121, In Russian with English summary. 9 refs.

The author discusses variations in species abundance and stage composition of 10 abundant species of Copepoda over a twelve-month period. A comparison of these results with data from other years (mainly summer season) in conjunction with an evaluation of the effects of hydrological factors suggests that *Calanus propinquus*, *C. acutus* and *Rhincalanus gigas* are depressed in enclosed bay conditions, while *Ctenocalanus*, *Microcalanus pigmaeus*, *Mertidia gerlashei* and *Oithona similis* demonstrated successful breeding and development. The effect on plankton communities of the local hydrological conditions, timing of spawning, and successful or unsuccessful development of larvae are also discussed. (Auth. mod.)

### B-57723

Saprykina, M.I., **Regional peculiarities of the maturation and spawning of *Euphausia superba* Dana in East Antarctica** [Regional'nye osobennosti sozrevaniia i neresta *Euphausia superba* Dana v more Sodruzhestva], *Antarktika*, 1995, No.33, p.122-131, In Russian with English summary. 23 refs.

Specimens of mature female *Euphausia superba* were examined in Jan. and Feb. 1981 and Feb. 1984. Determination of 3 maturation stages (prespawn, spawn and postspawn) and estimation of fecundity were carried out for 788 specimens with lengths from 43-56 mm. Cytoplasmic, trophoplasmic and completely ripe cells were counted separately in every specimen. Oocytes from all three maturation stages were measured. Individual fecundity varied from 3700 to 13300 cells. The ripening process of oocytes may be either interrupted or continuous. Females from inshore areas contained all types of cells in their ovaries simultaneously, but the ovaries of females from offshore areas contained only completely ripe cells. Many of the inshore females had both ripe and cytoplasmic cells, but no trophoplasmic cells. It is concluded that eggs may be shed from several pouches, and that the differences between the inshore and offshore environments may account for these differences between the two groups of *E. Superba* females. (Auth. mod.)

### B-57724

Nevinskii, M.M., **Larval abundance and estimated biomass recruitment of *Krefftichthys anderssoni* (Lönnberg) and *Electrona antarctica* (Günther) in the area of the Antarctic Convergence** [Chislennost' lichinok i otsenka biomassy popolneniia *Krefftichthys anderssoni* (Lönnberg) i *Electrona antarctica* (Günther) (sem. Myctophidae) v predelakh Iuzhnoi Poliarnoi frontal'noi zony (Antarkticheskii sektor)], *Antarktika*, 1995, No.33, p.132-139, In Russian with English summary. 30 refs.

Ichthyoplankton surveys were carried out along the Antarctic Convergence between Oct. 1987 and June 1989. Samples were collected in water layers of 700-0, 500-0 or 200-0 m. Preliminary estimates of the recruitment biomass (for fishes up to 1 year old) of *Krefftichthys anderssoni* and *Electrona antarctica* were based on a quantitative analysis of their larvae. The number of larvae was estimated using the log-normal distribution of their abundance below 1 m<sup>2</sup>. For all areas within the Atlantic sector of the Antarctic Convergence the biomasses of *K. anderssoni* and *E. antarctica* were estimated as 636.7 th.t. and 708.5 th.t. The maximum mean density was 0.3 t/Nm<sup>2</sup> or 0.1 g/m<sup>2</sup>. These figures indicate that the distribution of

both species is very dispersed, and that they do not form dense shoals, which suggests that by-catch of these species will not affect the pelagic ecosystem of antarctic waters. (Auth. mod.)

### B-57725

Bulavintsev, V.I., **Terrestrial fauna of the south polar region** [Nazemnaia fauna Iuzhnoi poliarnoi oblasti], *Antarktika*, 1995, No.33, p.140-156, In Russian with English summary. 29 refs.

The author gives a geographical analysis of the distribution within Antarctica of fauna from all groups of terrestrial animals, from protozoa to birds and mammals. Full lists of species are provided, with details of the degree of endemism, zoogeographical relations, and regional and latitudinal distribution of species. The stage of development of a fauna is discussed in relation to geological process and glaciation. The terrestrial microarthropods are shown to be a promising subject for further investigation of the genetics of fauna of high latitude terrestrial environments. (Auth. mod.)

### B-57726

Vekhov, N.V., **Regional peculiarities of the antarctic limnetic ecosystem** [Regional'nye osobennosti limnicheskikh ekosistem Antarktity], *Antarktika*, 1995, No.33, p.157-171, In Russian with English summary. 57 refs.

The author presents a review of research over the last 20-25 years, and analyzes the regional peculiarities of limnetic ecosystems (mainly in the southern part of Victoria Land, Schirmacher Ponds, and the Vestfold Hills) using specific characteristics described in the literature. The different origins, hydrology and hydrochemistry of the lakes, the species composition of primary producers (bacteria and algae) and the volume of primary production in each oasis are also presented as indicating the degree of diversity of these lake ecosystems. The limnetic differences may be related to the origin and evolution of the oasis regions. The peculiarities of the different limnetic systems in Antarctica are found to correspond to the distribution of specific animal communities, and this may account for some of the biogeographical differences which have been found. (Auth. mod.)

### B-57730

Tong, S., Vørs, N., Patterson, D.J., **Heterotrophic flagellates, centrohelid heliozoa and filose amoebae from marine and freshwater sites in the Antarctic**, *Polar biology*, Aug. 1997, 18(2), p.91-106, Refs. p.104-106.

Heterotrophic flagellates, centrohelid heliozoa and filose amoebae were recorded from cultures derived from water collected at marine and freshwater sites in the Antarctic. Marine samples were collected in the vicinity of Prydz Bay, and freshwater samples from Sombre Lake on Signy I. and Crooked and Druzhby lakes in the Vestfold Hills. Thirty-five species were identified. One new species, *Kiitoksia kaloista* (Protista *incertae sedis*), is described. The other species have been previously reported from other geographic locations, providing no evidence for endemism in protozoan species found in Antarctica. (Auth.)

### B-57731

Montgomery, J.C., Björn, K., Sutherland, W., **Sensory development of the Antarctic silverfish *Pleuragramma antarcticum*: a test for the ontogenetic shift hypothesis**, *Polar biology*, Aug. 1997, 18(2), p.112-115, 26 refs.

In 1996 Montgomery proposed an ontogenetic shift in the use of visual and non-visual senses in antarctic notothenioid fishes, with visual dominance in larval fishes giving way to non-visual senses in adults. One prediction of the hypothesis is timing differences in the development of the respective sensory systems, with the visual system expected to develop earlier than the other systems. The volume of certain brain centers can be determined from fixed material and should correlate with sensory development. This study determined the relative volumes of visual and lateral line brain areas, and relative eye size as a function of fish length in *Pleuragramma antarcticum*. The relative volume of optic tectum was largest in larval fish, exhibiting a negative allometry with growth. Results provide support for the ontogenetic shift hypothesis, and indicate that the timing of the shift probably occurs after the second winter. (Auth. mod.)

### B-57732

Azmi, O.R., Seppelt, R.D., **Fungi of the Windmill Islands, con-**



**tinental Antarctica. Effect of temperature, pH and culture media on the growth of selected microfungi**, *Polar biology*, Aug. 1997, 18(2), p.128-134, Refs. p.133-134.

Studies were conducted on microfungi isolated from soils in the Windmill Is. Growth responses of *Alternaria alternata*, *Chrysosporium pannorum*, *Nectria peziza*, *Thelebolus microsporus*, *Mycelia sterile* and *Phoma cf. herbarum* to temperature, pH and culture media were investigated. Maximum growth occurred after 16 days, except in *N. peziza* and *T. microsporus*, where maximum growth occurred 12 days after inoculation. All isolates showed poor growth at 0°C. Maximum growth was obtained with temperatures ranging from 15 to 25°C. The optimum temperature for all fungi was 20°C. An acid medium favored growth. *C. pannorum*, *P. cf. herbarum* and *N. peziza* grew best at pH 3-4, whereas *Mycelia sterile*, *A. alternata* and *T. microsporus* grew best at pH 5-6. The culture medium had little effect on growth, except for nutrient agar, which showed poor growth against all isolates with the exception of *T. microsporus*. (Auth.)

### B-57733

Perriss, S.J., Laybourn-Parry, J., **Microbial communities in saline lakes of the Vestfold Hills (eastern Antarctica)**, *Polar biology*, Aug. 1997, 18(2), p.135-144, Refs. p.143-144.

A detailed survey was undertaken of the microbial communities of 16 saline lakes in the Vestfold Hills, which ranged in salinity from slightly brackish to hypersaline. Temperatures at comparable sampling depths in the lakes ranged from -12.2°C to +10.5°C. The abundances of bacteria, heterotrophic nanoflagellates (HNAN) and phototrophic nanoflagellates (PNAN) varied. There was considerable variation across the salinity spectrum, though in the case of bacteria and PNAN significantly higher concentrations of cells were seen in 2 of the most saline lakes. The autotrophic ciliate *Mesodinium rubrum* occurred in all but 5 of the lakes and was found at salinity levels up to 108 per mill. Heterotrophic ciliates were generally scarce. Dinoflagellates, particularly *Gonyaulax cf. tamarensis*, *Gyrodinium lachryma* and *Gymnodinium* sp., occurred in the majority of the lakes. On the basis of chlorophyll *a* concentrations, nutrient levels and microplankton concentrations the lakes spanned the spectrum from ultralogotrophic to oligo/mesotrophic. (Auth. mod.)

### B-57735

Klinger, T.S., McClintock, J.B., Watts, S.A., **Activities of digestive enzymes of polar and subtropical echinoderms**, *Polar biology*, Aug. 1997, 18(2), p.154-157, 25 refs.

Activities and characteristics of digestive enzymes of polar and subtropical echinoderms are similar. Specific adaptations to facilitate digestion at low temperature were not observed. Levels of chymotrypsin and  $\beta$ -glucosidase of digestive tissues of the antarctic asteroids *Odontaster validus* and *Odontaster meridionalis*, and the antarctic echinoid *Sterechinus neumayeri*, are comparable to levels of the asteroids *Henricia downii* and *Astropecten articulatus* from the Gulf of Mexico.  $\alpha$ -Glucosidase activities are similar for *S. neumayeri* and *A. articulatus*. The pH of maximal activity is 7.5 for disaccharidases and 8.5-9.5 for chymotrypsin for both polar and subtropical species. Affinities for substrates were higher at 25°C than at 0°C for disaccharidases of all species. However,  $K_m$  values for chymotrypsin increased from 0 to 25°C. Lack of sufficient adaptation by polar echinoderms to facilitate digestion at low temperature may reduce their capacity to digest food. (Auth.)

### B-57736

Dartnall, H.J.G., **Three new species of *Encentrum* (Rotifera) from the Antarctic**, *Quekett journal of microscopy*, Spring 1997, 38(1), p.15-20, 14 refs.

Three new species of rotifers of the genus *Encentrum* (*E. brevifolium*, *E. forcipatum* and *E. salinum*) are described from fresh, brackish and marine lakes in the Vestfold Hills. (Auth.)

### B-57737

Sæther, B.E., Lorentsen, S.H., Tveraa, T., Andersen, R., Pedersen, H.C., **Size-dependent variation in reproductive success of a long-lived seabird, the antarctic petrel (*Thalassoica antarctica*)**, *Auk*, July 1997, 114(3), p.333-340, 51 refs.

The authors examined how variation in parental quality influences the reproductive success of the antarctic petrel. The focus is on how quality of parents can interact with and influence the effects of stochastic variation in the environment due to varying climatic conditions. Large annual variation was found in reproductive success. Body mass of individual chicks at the end and beginning of the nestling period was related both to overall body size and to body mass of their parents. Short brooding-shift intervals also were important for growth and survival of chicks. The probability of chick survival to the age of 30 days, ca. two weeks before fledging, was strongly correlated with chick mass when the chick was left unattended. However, the relative importance of different parental characteristics differed between years. These results show that reproductive success of the antarctic petrel is influenced by stochastic variation in the environment, probably related to climatic conditions. Effects of this stochastic variation may depend on body mass and/or body condition of the parents. (Auth. mod.)

### B-57738

Janes, D.N., **Osmoregulation by Adélie penguin chicks on the Antarctic Peninsula**, *Auk*, July 1997, 114(3), p.488-495, 30 refs.

The author measured water and salt contents in the food, excreta, and body fluids of Adélie penguin (*Pygoscelis adeliae*) chicks to determine patterns of osmoregulation. Adélie penguins eat krill (*Euphausia* spp.) and feed the same to their chicks by regurgitation. Adélie chicks sometimes receive food that is significantly saltier than their body fluids, but on average the food has salt concentrations similar to those in their plasma. Adélie chicks excrete excess solutes via the salt glands, which are fully functional at hatching, and via the kidneys, which produce urine that is more concentrated relative to urine of other bird species. Larger chicks receive food that is drier than that eaten by smaller chicks, and larger chicks may compensate by excreting more of a given salt load via the salt glands, thus conserving water. Regurgitated food has significantly less  $\text{Na}^+$  than  $\text{Cl}^-$ , but the salt glands secrete equal amounts of these two ions. Consequently, in large chicks  $\text{Na}^+$  may be shunted from the urine to be excreted via the salt glands. The loss of this cation in the urine is compensated for by addition of  $\text{NH}_4^+$ . (Auth.)

### B-57739

Hodgson, D.A., Johnston, N.M., **Inferring seal populations from lake sediments**, *Nature*, May 1, 1997, 387(6628), p.30-31, 10 refs.

An explosion in the population of antarctic fur seals (*Arctocephalus gazella*) has caused widespread changes to many coastal terrestrial and freshwater ecosystems in the northern maritime antarctic islands and on the west coast of the Antarctic Peninsula. The authors have used seal hairs found in lake sediment cores from one maritime antarctic island as a historical record of seal populations. This has enabled an examination for possible causes of the increasing numbers of visiting antarctic fur seals, and has provided a historical framework from which to evaluate conservation plans to minimize the adverse effects of seals at sites of particular ecological significance.

### B-57744

Barnes, D.K.A., Bullough, L.W., **Some observations on the diet and distribution of nudibranchs at Signy Island, Antarctica**, *Journal of molluscan studies*, Aug. 1996, 62(3), p.281-287, 25 refs.

Observations were made on the diet and distribution of 8 species of nudibranchs found in Borge Bay, Signy I. Specimens from 7 sites were examined *in situ* on 4 separate occasions during 1992 and 1993 using SCUBA. Six of the 8 species present were identified, and the first ecological data for at least one species (*Charcotia granulosa*) were recorded. *Notaeolidia gigas* was feeding principally on hydroids of the genus *Tubularia* over the entire depth range surveyed (3-36 m), and was most abundant in shallow water, whereas *Tritoniella belli* was only found at deeper sites, mostly on an octocoral of the genus *Ascolepis*. *C. granulosa* and *Pseudotritonia gracilidens* appeared to be specialist bryozoan feeders and, as has been found at other locations, *Austrodoris kerguelenensis* specialized on the demosponge *Dendrilla antarctica*. Two unidentified aerolid species occurred almost entirely on particular hydroids and the prey of *Tritonia antarctica* was not apparent. (Auth. mod.)

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**B-57745**

Peck, L.S., Baker, A.C., Conway, L.Z., **Strontium labelling of the shell of the Antarctic limpet *Nacella concinna* (Strebel, 1908)**, *Journal of molluscan studies*, Aug. 1996, 62(3), p.315-325, Refs. p.324-325.

*Nacella concinna* (Strebel, 1908) held in seawater enriched with Sr, partially replaced Ca in their shells with Sr. The bands laid down were clearly visible in backscattered, scanning electron microscope images, and such bands could be used to mark carbonate skeletons in field investigations of growth. Sr directly replaced Ca in the carbonate shells, although not entirely, and newly secreted shell material always contained less Sr than would be expected from the levels used in treatments. In specimens where growth bands were visible, it was only possible to distinguish between 5 and 8 micro-growth lines. In specimens removed after 3 days exposure, there was no detectable area of enhanced Sr in the shell. These two observations were interpreted as either meaning that it takes around 5 days for Sr to enter the extra-pallial fluids which are used for laying down shell, or that the limpets did not produce any shell growth during that period. Experiments placing Sr in food and not in the treatment water, and vice-versa, suggested that Sr taken directly from the water may be more important than uptake from food. (Auth. mod.)

**B-57748**

Xu, X.Q., Beardall, J., **Effect of salinity on fatty acid composition of a green microalga from an Antarctic hypersaline lake**, *Phytochemistry*, June 1997, 45(4), p.655-658, 24 refs.

The major fatty acids in a *Dunaliella* sp. isolated from the antarctic hypersaline Stinear Lake were 18:3 $\omega$ 3, 16:0 and 16:4 $\omega$ 3, which together accounted for 72-75% of the total fatty acids in the cells. The fatty acid composition was modified by varying the salinity in the growth medium. With salinity increasing from 0.4 M to 4 M NaCl in the cultures, the proportion of total saturated and monounsaturated fatty acids increased, while total polyunsaturated fatty acids decreased. All the  $\omega$ 3 fatty acids showed negative trends to salinity. Total polyunsaturated fatty acid content was about 10% higher in the low salinity culture. Results suggest that increasing salinity in the growth medium increases the degree of fatty acid saturation and, hence, reduces the fluidity and permeability of the microalgal membranes. (Auth.)

**B-57752**

Hull, C.L., Hindell, M.A., Michael, K., **Foraging zones of royal penguins during the breeding season, and their association with oceanographic features**, *Marine ecology progress series*, July 10, 1997, Vol.153, p.217-228, Refs. p.227-228.

Satellite transmitters were deployed on breeding royal penguins at Macquarie I. during 4 stages of the 1994-95 and 1995-96 breeding seasons. From these data, foraging zones, oceanographic features of the zones, and travelling behaviors were determined. Foraging trip length, area of foraging zone, and distance travelled were strongly correlated, and were greatest during incubation. Foraging during all stages of the breeding season was offshore, in deep water (greater than 2000 m) and in the polar frontal zone. During the incubation stage the foraging zones were circular. It is concluded that the foraging behavior of royal penguins is closely linked to the polar frontal zone, their prey, and the constraints of the breeding season. (Auth. mod.)

**B-57753**

Wöhrmann, A.P.A., Hagen, W., Kunzmann, A., **Adaptations of the Antarctic silverfish *Pleuragramma antarcticum* (Pisces: Nototheniidae) to pelagic life in high-Antarctic waters**, *Marine ecology progress series*, May 22, 1997, 151(1-3), p.205-218, Refs. p.216-218.

One of the rare truly pelagic fish species, *Pleuragramma antarcticum*, plays a pivotal role in antarctic food webs, due to its exceptional abundance. To investigate the life history of *P. antarcticum* more than 16,000 specimens were collected in the Weddell Sea. Apart from the more general life cycle adaptations with respect to reproduction, migrations, and feeding behavior, *P. antarcticum* has developed a number of specific biochemical and physiological adaptations to cope with the environmental conditions in these highly seasonal antarctic waters. During its second summer *P. antarcticum* starts to accumulate large lipid deposits, mainly in the form of triacylglycerols. To avoid freezing in the presence of frazil ice

*P. antarcticum* contains efficient antifreeze glycoproteins. A newly discovered glycoprotein acts as an additional antifreeze agent. *P. antarcticum* represents a prime example of the complexity of adaptations necessary to thrive in the pelagic realm of antarctic shelf waters, a niche largely unoccupied by other fish species. (Auth. mod.)

**B-57754**

Weimerskirch, H., Wilson, R.P., Lys, P., **Activity pattern of foraging in the wandering albatross: a marine predator with two modes of prey searching**, *Marine ecology progress series*, May 22, 1997, 151(1-3), p.245-254, Refs. p.253-254.

The foraging activity of wandering albatrosses *Diomedea exulans* was studied with simultaneous use of satellite transmitters, activity recorders and loggers measuring the timing of feeding. On average birds spent 60% of their foraging time in flight, mostly during the day, and 40% on the water, mainly at night. Birds landed on the water on average 27 times per day. During the day prey were located in flight and caught just after landing. At night prey were caught using a 'sit-and-wait' technique. A mean of 3.8 landings were necessary to catch 1 prey item. Two main foraging behaviors were recognized: birds followed long curvilinear search routes over oceanic waters where they landed on water irregularly; and birds concentrated their searching in a defined area and exhibited multiple take-offs and landings, changing flight direction regularly over a short period. The evolution of these 2 contrasting behaviors is discussed in terms of the trade-off between rate of prey capture and energy costs of flight. (Auth. mod.)

**B-57755**

Longshaw, M., ***Caligus nolani* n. sp. (Copepoda: Caligidae), a parasite of *Patagonotothen sima* (Richardson) (Teleostei: Pisces) from the Falkland Islands, and a note on *Clavella bowmani*, Kabata, 1963 (Copepoda: Lernaepodidae)**, *Systematic parasitology*, June 1997, 37(2), p.149-155, 5 refs.

Both sexes of a new species of parasitic copepod, *Caligus nolani* (Caligidae: Siphonostomatoida) from the skin of the nototheniid fish *Patagonotothen sima* from the Falkland Is. are described. The male differs superficially from the female in having a more rounded cephalothoracic shield, thinner genital complex and a two-segmented abdomen. *C. nolani* can be separated from all other species of *Caligus* by the shapes of the sternal furca and second antenna. *Clavella bowmani* Kabata, 1963 from *P. sima* is the first record of this species from the Falkland Is. (Auth.)

**B-57756**

Hoshiai, T., Tanimura, A., Watanabe, K., Fukuchi, M., **Algae-copepod-fish link associated with antarctic sea ice**, *Marine biology*. Its accomplishment and future prospect. Edited by J. Mauchline and T. Nemoto, Amsterdam, Elsevier, 1991, p.237-246, 18 refs.

**DLC QH91.A1M352 1991**

In the Showa Station area the proliferation of ice algae at the bottom of the sea ice occurred in autumn and spring. The calanoid copepod, *Paralabidocera antarctica* appeared as a prominent component of ice meiofauna in autumn and persisted through the winter. Growth of this species began in and followed the autumnal ice algal peak and occurred simultaneously with the spring algal peak. Analysis of gut contents showed that the copepod fed on ice algae. Stomach contents of fry of the nototheniid fish, *Pagothenia borchgrevinki* which were caught beneath the ice in winter contained nauplii of *P. antarctica* with other zooplankters. It is concluded that *P. antarctica* functions as a conveyor of ice algal primary production to such higher consumers as *P. borchgrevinki* in the antarctic coastal ecosystem. (Auth.)

**B-57757**

Strömberg, J.O., **Marine ecology of polar seas: a comparison Arctic/Antarctic**, *Marine biology*. Its accomplishment and future prospect. Edited by J. Mauchline and T. Nemoto, Amsterdam, Elsevier, 1991, p.247-261, Refs. p.260-261.

**DLC QH91.A1M352 1991**

An Antarctic-Arctic comparison is made of the polar seas and their biology, hydrography, sea ice and its associated flora and fauna, phytoplankton, zooplankton and benthos. It is noted that recent deep faunal



samples from the Antarctic seem to be very rich, although the general composition of the macrozoobenthos does not seem to be very different between the two poles. Thus, it is concluded that the structure of the benthic ecosystems, as evolved in the two hemispheres, is rather similar.

#### B-57761

Alger, A.S., et al, **Ecological processes in a cold desert ecosystem: the abundance and species distribution of algal mats in glacial meltwater streams in Taylor Valley, Antarctica, University of Colorado. Institute of Arctic and Alpine Research. Occasional paper, 1997, No.51, 108p., Refs. p.34-36.**

This report presents results on the abundance and species distribution of algal mats at 16 stream sites in Taylor Valley. Results indicate that species of filamentous cyanobacteria are the most abundant algae in the dry valley streams. Algal mats were classified on the basis of on apparent color into 4 mat types. "Black-colored algae" were found in the wetted zone adjacent to the streambed and were primarily composed of *Nostoc*. "Green-colored algae" were found attached to the surface/undersurface of rocks in the main stream channel and were mainly composed of *Prasiola*. "Orange-colored" and "red-colored algae" occurred in the streambed regions with the greatest flow and had a greater diversity of species. The abundance of algal mats is controlled by sediment transport and the characteristics of the streambed. Algal mats were more abundant in streams where the streambed is composed of a stone pavement. In streams with abundant algal mats, the nutrient concentrations are lower than in streams with sparse algal mats. (Auth. mod.)

#### B-57763

Numanami, H., **Taxonomic study on antarctic gastropods collected by Japanese Antarctic Research Expeditions, Tokyo. National Institute of Polar Research. Memoirs. Series E, Biology and medical science, Sep. 1996, No.39, 244p., Refs. p.240-244.**

The present study was based on gastropod specimens collected by the Japanese Antarctic Research Expeditions (JARE) at 5 stations in Breid Bay (depth range 271-310 m), 2 stations in Günnerus Bank (depth 280 m and 955 m) with the bottom trawl, and around Showa Station (0-680 m) with baited traps, small dredge and by scuba diving. Ninety species of 24 families and 44 genera were identified; 17 new species and one new subspecies are described. The most diverse family was the Buccinidae, occupying 19% (17 species) of the total number of species observed. Seventy-eight species were collected in Breid Bay, 12 species in Günnerus Bank and 10 species from around Showa Station. Twenty-one species (23.3%) were collected from the study area, 32 (35.6%) have hitherto been reported from East Antarctica, 3 species have been reported from West Antarctica, 24 (26.7%) are circum-Antarctic, and 10 species (11.1%) occur in both the antarctic and subantarctic regions. New information on the bathymetric distribution of the species is given. (Auth. mod.)

#### B-57764

Peña Cantero, A.L., Svoboda, A., Vervoort, W., **Species of *Oswaldella* Stechow, 1919 (Cnidaria, Hydrozoa) from recent antarctic expeditions with R.V. 'Polarstern', with the description of eight new species, Linnean Society of London. Zoological journal, Mar. 1997, 119(3), p.339-388, 25 refs.**

Twelve species of the genus *Oswaldella* Stechow have been studied, 8 of which are new to science (*Oswaldella delicata* n.sp., *O. garciacarras-cosai* n.sp., *O. gracilis* n.sp., *O. grandis* n.sp., *O. incognita* n.sp., *O. obscura* n.sp. and *O. rigida* n.sp.), originating from the Weddell Sea and collected by several antarctic expeditions and R.V. *Polarstern*. Each is described and figured, its systematic position is considered and current data concerning its autecology and geographical distribution are given. Finally, a comparative table is presented including the principal features of all known species of the genus. (Auth.)

#### B-57765

Iverson, S.J., Arnould, J.P.Y., Boyd, I.L., **Milk fatty acid signatures indicate both major and minor shifts in the diet of lactating Antarctic fur seals, Canadian journal of zoology, Feb. 1997, 75(2), p.188-197, With French summary. Refs. p.196-197.**

The authors applied fatty acid signature analysis to milks collected from antarctic fur seals (*Arctocephalus gazella*) at South Georgia in 1990-91. The fatty acid signature of perinatal milks was significantly different

from that of all other milks, suggesting differences in the prepartum diet when females are away from the breeding grounds. At the onset of foraging periods, the fatty acid composition of milks changed dramatically to reflect a diet composed mainly of krill. However, during late foraging periods, milk fatty acids again changed from those of early and mid foraging, and suggested a predominance of teleost fish in the diet. These findings were consistent with independent assessments of diet by faecal analysis and indicate the potential value of fatty acid signature analysis in studying foraging ecology in free-ranging pinnipeds. (Auth. mod.)

#### B-57769

Bourne, W.R.P., David, A.C.F., **Early history and ornithology of St. Paul and Amsterdam islands, southern Indian Ocean, Gerfaut, 1995, Vol.85, p.19-36, With Flemish and French summaries. Refs. p.32-35.**

The history and early information about the avifauna of Amsterdam and Saint Paul islands, as it existed before its devastation by man and introduced mammals, is reviewed. At least three important endemic forms are recognized, including a derivative of the most migratory northern duck, and a specialized albatross and prion. The duck is now extinct, the prion may have spread south, and the albatross to the equivalent area in the Pacific. While most seabirds survive in reduced numbers mainly on islets off St. Paul and cliffs on Amsterdam, about 6 petrels are extinct.

#### B-57779

Willen, E., ***Pseudomesochra* T. Scott 1902 as a member of the Paranannopidae POR 1986 (Copepoda, Harpacticoida) with a description of three new species, Senkenbergiana maritima, Dec. 1996, 28(1/3), p.81-109, 25 refs.**

Three new species of the genus *Pseudomesochra* T. Scott 1902 from the Weddell Sea and the Laptev Sea are described. The male CV stage specimen of *Pseudomesochra meridianensis* s.n. found in the Weddell Sea is regarded as the first true record of a male of *Pseudomesochra*. It is shown that the genus has to be removed from the family Diosaccidae Sars 1906 and instead has affinities with the Paranannopidae Por 1986. The Paranannopidae including *Pseudomesochra* share a Mxp with only 2 syncoxal and 1 basal seta, a deeply incised anal somite with a pseudoperculum instead of a well developed anal operculum, a lost or vestigial caudal seta I, a similar structure of the female genital field and a segmental apophysis on the male P3 enp2, a non-prehensile and 2-segmented Plenp, only 4 endopodal setae and a spine-like pinnate seta on the proximal syncoxal endite of the Mx. The latter 3 characters seem to separate the Paranannopidae from closely related taxa of the thalestrid subfamilies Pseudotachidiinae sensu Lang 1936 and Donsiellinae Hicks 1988. Showing several autapomorphies, *Pseudomesochra* has an isolated position within the Paranannopidae, therefore a new subfamily Pseudomesochrinae is proposed containing only the type genus *Pseudomesochra*. An amended key to the species is given. (Auth.)

#### B-57780

Thomsen, H.A., Garrison, D.L., Kosman, C., **Choanoflagellates (Acanthoecidae, Choanoflagellida) from the Weddell Sea, Antarctica, taxonomy and community structure with particular emphasis on the ice biota; with preliminary remarks on choanoflagellates from Arctic sea ice (Northeast Water Polynya, Greenland), Archiv für Protistenkunde, June 1997, 148(1-2), p.77-114, 39 refs.**

Ice biota studies in the Weddell Sea have focused on an examination of single cells and an analysis of community structure of the flagellate assemblage from sea ice and comparisons with planktonic assemblages. Based on extensive light microscopical analysis of 30 samples ranging from open water to "brown-ice" habitats, it became evident that the mature choanoflagellate community from ice is significantly different from both the water column community and those encountered in samples derived from newly formed ice. The choanoflagellates from sea ice encompasses a range of previously undescribed loricate taxa (*Acanthocorbis nana* n.sp., *A. weddellensis* n.sp., *A. prolongata* n.sp., *Apheloecion antarctica* n.sp., *A. glacialis* n.sp., *A. conicoides* n.sp., *Calliacantha frigida* n.sp., *C. ankyra* n.sp., *Diaphanoeca multiannulata* n. subsp. *glacialis*, *Parvicorbicula corynocostata* n.sp., and *P. pachycostata* n.sp.). These taxa have been investigated using a combination of light, and electron microscopy. (Auth. mod.)



**B-57783**

Dastyh, H., Drummond, A.E., **Notes on limnic water-bears (Tardigrada) from the Robertskollen nunataks, Dronning Maud Land, Antarctica, Hamburg. Zoologisches Museum. Entomologische Mitteilungen**, Oct. 15, 1996, 12(154), p.111-117, With German summary. 29 refs.

Three tardigrade species, *Hypsibius antarcticus* (Richters), *Diphascon pingue* (Marcus) and *Diphascon sanae* Dastyh et al., are reported from limnic habitats in the Ahkmanryggen nunataks, Queen Maud Land. A record of *H. antarcticus* rediscovered recently in freshwater samples from Mt. Erebus and Ross I. (collection of Murray, the Natural History Museum, London) is also provided.

**B-57784**

Millar, C.D., Lambert, D.M., Young, E.C., **Minisatellite DNA detects sex, parentage, and adoption in the south polar skua**, *Journal of heredity*, May/June 1997, 88(3), p.235-238, 19 refs.

The south polar skua (*Catharacta maccormicki*) is a long-lived seabird. Adults of this species exhibit only a small degree of sexual dimorphism, while male and female juveniles and chicks are morphologically indistinguishable. Female-specific DNA fragments were detected in the minisatellite profiles of south polar skua with the multilocus probes 33.15 and pV47-2. Either one or two sex-specific fragments were absent from each male. A significant difference was also detected in the mean number of bands recorded for each sex. South polar skua breed in pairs and often raise only a single chick. DNA profiles resulting from hybridization of the probe 33.15 were used to establish parentage of 14 chicks from 13 families. In all but two families the chicks were parented by the resident adults. In one of these families the chick was shown to be the product of extrapair paternity, while the chick in the other family was found to be the offspring of neither of the resident adults. The authors suggest the latter is an example of the adoption of a chick from a neighboring territory. (Auth.)

**B-57786**

Bryan, P.J., Yoshida, W.Y., McClintock, J.B., Baker, B.J., **Ecological role for pteroenone, a novel antifeedant from the conspicuous antarctic pteropod *Clione antarctica* (Gymnosomata: Gastropoda)**, *Marine biology*, Apr. 1995, 122(2), p.271-277, 46 refs.

**DLC QH91.A1 M35**

Dense populations of the antarctic pteropod *Clione antarctica* (Smith) offer a rich source of potential nutrients and energy to planktivorous predators. Nonetheless, antarctic fish do not prey on *C. antarctica*. Employing flash and high-pressure liquid chromatographic techniques, a linear  $\beta$ -hydroxyketone, pteroenone ( $C_{14}H_{24}O_2$ ) was isolated from whole tissues of *C. antarctica*. When embedded in alginate food pellets at ecologically relevant concentrations, pteroenone caused significant feeding deterrence in *Pagothenia borchgrevinki* and *Psuedotrematomas bernacchii*, two antarctic fish known to feed on planktonic organisms. Concentrations of pteroenone were variable between pteropods, but even those individuals with the lowest natural concentration contained levels five-fold greater than the lowest effective feeding-deterrent concentration. Chemical analysis indicated that the primary dietary item of the carnivorous *C. antarctica*, the shelled pteropod *Limacina helicina*, does not contain pteroenone. This suggests that *C. antarctica* does not derive this defensive compound from its diet. This is the first example of a defensive secondary metabolite in a pelagic gastropod. (Auth. mod.)

**B-57789**

Claustre, H., Moline, M., Pr zelin, B., **Variations in the water column photosynthetic cross section for antarctic coastal waters**, *SPIE-The International Society for Optical Engineering. Proceedings*, 1997, Vol.2963, Ocean optics 8. Edited by S.G. Ackleson et al, p.846-849, 6 refs.

**DLC GC177.6.O27 13**

Using a highly resolved Long Term Ecological Research data base collected near Palmer Station, from 1991-94, the variability in the column photosynthetic cross section  $\Psi^*$  was analyzed. A six-fold variation in  $\Psi^*$  was observed with time of year and was strongly associated with the high seasonality in incident irradiance characteristic of these polar sampling sites. Results illustrate the validity of  $\Psi^*$  based approaches for estimating

primary production for the southern ocean but emphasize the need to address taxon-specific photophysiology to better estimate primary production on smaller spatio-temporal scales. (Auth. mod.)

**B-57791**

Hansson, L.A., Tranvik, L.J., **Quantification of invertebrate predation and herbivory in food chains of low complexity**, *Oecologia*, Nov. 1996, 108(3), p.542-551, 45 refs.

The invertebrate predators in two subantarctic lakes had only a marginal predation impact compared to the predation pressure on zooplankton in the presence of vertebrate predators in temperate lakes. The study of these simple systems with only two quantitatively functionally important trophic links, suggests that high grazing pressure forces the algal community towards forms with grazer resistant adaptations such as large size, recruitment from another habitat, and grazer avoidance spines. It is proposed that due to such adaptations, predictions from food web theory are only partly corroborated, i.e. algal biomass actually increases with increasing productivity, although the grazer community is released from predation. In more species-rich and complex systems, such adaptations are likely to be even more important, and, consequently, the observable effects of trophic interactions from top predators on lower trophic levels even more obscured. (Auth. mod.)

**B-57800**

D hler, G., **Assimilation of inorganic nitrogen by antarctic and temperate marine phytoplankton species under UV stress**, *Russian journal of plant physiology*, July-Aug. 1997, 44(4), p.518-525, Translated from *Fiziologiya rastenii*. 30 refs.

Natural phytoplankton samples and sea-ice algae from the Weddell Sea were exposed to UV-A and UV-B under controlled laboratory conditions during two *Polarstern* cruises. Additionally, the influence of UV radiation on phytoplankton assemblages of the North Sea, German Bight, and of unialgal cultures of temperate marine diatoms were investigated. Pigment biosynthesis by natural phytoplankton and sea-ice algae was inhibited by UV-B and enhanced after UV-A radiation. Results were discussed with respect to the effect of UV radiation on the key enzymes of nitrogen metabolism as related to adaptation strategies of algae to environmental UV conditions. (Auth. mod.)

**B-57804**

McGraw, J.B., Day, T.A., **Size and characteristics of a natural seed bank in Antarctica**, *Arctic and alpine research*, May 1997, 29(2), p.213-216, 32 refs.

The seed banks of *Colobanthus quitensis* and *Deschampsia antarctica*, the only two vascular plants native to Antarctica, were assayed by collecting soils from two sites near Palmer Station, and germinating seeds in a laboratory germination facility. Both species were found to have a substantial seed bank, comparable in size to those of arctic and alpine species. The buried seed density was not correlated with the local aboveground abundance where both species were present, although at one site where a species was absent from the vegetation it was also not found in the seed community. Antarctic seed banks have important implications for both the decline and spread of plant populations in response to a changing climate. (Auth. mod.)

**B-57805**

Grobe, C.W., Ruhland, C.T., Day, T.A., **New population of *Colobanthus quitensis* near Arthur Harbor, Antarctica: correlating recruitment with warmer summer temperatures**, *Arctic and alpine research*, May 1997, 29(2), p.217-221, 22 refs.

The authors discovered a previously unreported population of the antarctic vascular plant *Colobanthus quitensis* (Kunth) Bartl. containing 267 individuals on Gamage Point. Cushion recruitment per mature cushion in the Gamage Point population was positively correlated with mean summer (Dec.-Feb.) air temperatures, suggesting that temperature is an important factor limiting the establishment of *C. quitensis* in the maritime Antarctic. The presence of apparently suitable but uncolonized sites in the proximity of established populations of vascular plants, combined with increasing mean summer air temperatures on the Antarctic Peninsula, suggest that expansion of existing populations and the establishment of new populations on the Antarctic Peninsula is likely to continue. (Auth. mod.)



**B-57806**

Zimmermann, C., **Ecology of fish in polar regions** [Zur Ökologie arktischer und antarktischer Fische: Aktivität, Sinnesleistungen und Verhalten], *Berichte zur Polarforschung*, 1997, No.231, 137p., In German with English summary. 124 refs.

Respiration, activity, behavior and reaction to various optical and chemical stimuli were determined for 4 antarctic and 3 arctic fish species. Experiments were conducted at McMurdo Station, Spitsbergen, and Kiel. The calculated Standard Oxygen Consumption (SOC) ranged from 8.0 mg O<sub>2</sub>/h/kgWW for an antarctic *Pogonophryne* sp. to 68 mg O<sub>2</sub>/h/kgWW for a large and very active Arctic *Myoxocephalus scorpius*. The individual variability was generally high. Routine oxygen consumption was 6 to 8 times higher compared to the calculated SOC, depending on the amount of activity. A literature comparison with fish of boreal and tropical climates showed almost no specific "polar" adaptations to the specific conditions of their habitats, with respect to activity, respiration rates, sensory capabilities or behaviors. Differences between species regarding activity patterns and metabolism are much better explained by ecotype than by geographical origin. (Auth. mod.)

**B-57807**

Linse, K., **Mollusc comparison in the Chilean Beagle Channel and Antarctica** [Die Verbreitung epibenthischer Mollusken im chilenischen Beagle-Kanal], *Berichte zur Polarforschung*, 1997, No.228, 131p., In German with English summary. Refs. p.101-110.

In autumn 1994 the Chilean-German-Italian joint research project "Joint Magellan-Victor Hensen Campaign" took place to investigate marine fauna and flora of the Magellan region. One of the aims of this research project was a faunistic comparison between the Magellan region and Antarctica. The present study focuses on both a taxonomic-systematical inventory of epibenthic mollusca from the Beagle Channel and an ecological approach, i.e. the attempt to explain changes and differences in the molluscan composition in the Beagle Channel. The material was sampled by the epibenthic sledge; 18 stations were taken at 12 sample locations. The depth of the hauls ranges between 25 and 665 m. The first brief comparison of the Magellanic and the antarctic malacofauna showed strong similarities. Further investigations focus on biogeography, species communities and ecology of some selected species for example in feeding ecology and reproduction biology. (Auth. mod.)

**B-57808**

Kück, K., **Antifreeze enzymes for polar algae** [Der Einfluß kompatibler Substanzen und Kryoprotektoren auf die Enzyme Malatdehydrogenase (MDH) und Glucose-6-phosphat-Dehydrogenase (G6P-DH) aus *Acrosiphonia arcta* (Chlorophyta) der Arktis und Antarktis], *Berichte zur Polarforschung*, 1997, No.227, 127p., In German with English summary. Refs. p.109-125.

Polar macroalgae are not only exposed to permanent cold but may also be damaged from complete freezing on a cellular level. In macroalgae of the polar regions, biochemical properties of the enzyme systems and/or the presence of protective substances such as dimethylsulfoniopropionate (DMSP), proline and sucrose may be of major importance to survive extreme environmental conditions. This study investigated selected enzymes for their activities at low temperatures and their response to additions of potential antifreeze substances. It also verified DMSP, proline and sucrose not only as osmolytes but also as compounds with cryoprotective properties at various kinds of temperature stress through chilling and freezing. The mechanisms and extent of the protective effects are very specific and exhibit high enzyme specificity as well. (Auth. mod.)

**B-57810**

Stelzer, U., Dreisbach, C., **Three-step enzymic process for the resolution of arylalkylamines, Germany. Patent Office. Patent**, June 12, 1997, 17p., DE 19637336.

The patent points to a method for decomposing aromatic carbons in which the yeast *Candida antarctica* is involved.

**B-57814**

Cherel, Y., Ridoux, V., Rodhouse, P.G., **Fish and squid in the diet of king penguin chicks, *Aptenodytes patagonicus*, during win-**

**ter at sub-antarctic Crozet Islands, *Marine biology*, Oct. 1996, 126(4), p.559-570, 47 refs.**

The diet of king penguins, *Aptenodytes patagonicus*, rearing chicks was studied during three consecutive austral winters (1990, 1991 and 1992) on Crozet Is. The mean stomach content mass of the 47 samples was 503 g. Percentages of wet and reconstituted masses showed that both fishes (66 and 36%, respectively) and squid (34 and 64%) are important components of the winter diet. Both the known ecology of the fish and squid prey and the barely digested state of some items suggest that in winter breeding adults forage in the outer shelf, upper slope and oceanic areas in the close vicinity of the Crozet Is. to feed their chicks. Using king penguins as biological samplers, the present work provides novel data on the mesopelagic/epibenthic marine community in water surrounding the Crozet Is. Seventeen myctophid fish have been identified to species level. These include several poorly known species in the southern Indian Ocean. The occurrence of small, nearly intact, cephalopods in the diet of king penguins suggests that spawning grounds of four squid species may be located near the Crozet Archipelago. (Auth. mod.)

**B-57817**

Tumeo, M.A., Guinn, D.A., **Evaluation of bioremediation in cold regions, *Journal of cold regions engineering*, Sep. 1997, 11(3), p.221-231, Refs. p.228-231.**

Biological treatment has become increasingly popular as a remediation method for soils and ground water contaminated with petroleum hydrocarbon, chlorinated solvents, and pesticides. Bioremediation has been considered for application in cold regions such as arctic and subarctic climates and Antarctica. Studies to date suggest that indigenous microbes suitable for bioremediation exist in soils in these regions. This paper reports on two case studies in which indigenous bacteria were found that were capable of mineralizing petroleum hydrocarbons in soil contaminated with jet fuel and polychlorinated biphenyls (PCBs) in Antarctica and pentachlorophenol (PCP) and diesel in contaminated soil in the subarctic Alaska. However, in both instances, ex-situ bioremediation was recommended for treatment of the contaminated soil because ex-situ treatment allows greater control over soil temperature, a limiting factor in cold climates. (Auth. mod.)

**B-57819**

Bozal, N., Tudela, E., Llarch, A., Castellví, J., Guinea, J., **Taxonomy of bacterial isolates from different areas** [Caracterización taxonómica de aislamientos bacterianos procedentes de distintas zonas de la Antártida], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.13-19, In Spanish with English summary. Refs. p.18-19.

Identification of different bacterial isolates collected on Livingston, King George and Deception islands indicate a clearly marine distribution of the following species: *Alteromonas*, *Vibrio* o *Flavobacterium*; bacteria of wide distribution, such as those belonging to the genera *Pseudomonas* o *Alcaligenes*; microorganisms with more resistant cellular walls, gram-positive, such as *Micrococcus*, *Planococcus* o *Marinococcus*; thermophilic bacteria of the genera *Bacillus*; and microorganisms of the genera *Moraxella* which, until now, had been described as to be related only to men and animals. (Auth. mod.)

**B-57820**

Basterretxa, G., Arístegui, J., **Models for primary productivity in the Bransfield Strait** [Modelos de producción primaria en el Estrecho de Bransfield], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.21-38, In Spanish with English summary. Refs. p.35-37.

Results of two conceptually different primary production models, applied to the Bransfield Strait during summer, are discussed. The first model is based on light availability and the performance of photosynthesis-irradiance curves. Production values obtained with this model are very similar to *in situ* incubations. The second model estimates primary production from absorbed light spectra and quantum yield, allowing estimations of carbon fixation rates without need of incubations. Production



rates obtained by this method show a close relationship to those obtained from the other model, although data are slightly overestimated. Applying both models to different areas of the Bransfield Strait shows a general distribution of primary production in the area: higher values are found in the western region of the Strait. (Auth. mod.)

**B-57821**

Montero, M.F., Arístegui, J., **Microplankton respiratory metabolism in waters off the Antarctic Peninsula** [Metabolismo respiratorio del microplancton en aguas de la Península Antártica], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.39-54, In Spanish with English summary. Refs. p.52-54.

The respiration of microplankton (<200 µm), measured as direct oxygen consumption and electron transport system activity, was studied during two cruises carried out in waters off the Antarctic Peninsula, in Dec. 1991 and Jan., 1993. Both types of estimations showed close correlation, and enzymatic measurements were transformed to actual respiration rates. Carbon balances performed in surface waters (0-100 m) of the Bransfield Strait showed that community (microplankton) respiration represented a greater loss of carbon than previously considered in recently published carbon flow models from the area. However, these losses were not constant. The highest respiratory activities were associated with frontal areas between different water masses of the Bransfield Strait. Results show that it is necessary to study the spatial variability of the microplankton respiration to understand the carbon cycle in coastal antarctic waters. (Auth.)

**B-57822**

Morales-Nin, B., Palomera, I., **Spring ichthyoplankton distribution in the Bransfield Strait** [Distribución del ictioplancton en el Estrecho de Bransfield en la primavera austral], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.55-61, In Spanish with English summary. 9 refs.

The spatial distribution, species composition and abundance of ichthyoplankton in Bransfield Strait and adjacent waters was studied during the 1991-92 spring season. A multiple plankton net (Bioness) and a Bongo were used to collect samples at 35 stations. Early larval stages and juveniles of 14 species, representing the known Bransfield Strait ichthyofauna, were present in the water column. The nototheniids predominate in all the study area; the greatest species diversity was found in the uppermost 200 m of the water column. *Notothenia gibberifrons* and *Nototheniops larseni* dominated in abundance and frequency of occurrence in the entire area investigated. (Auth. mod.)

**B-57823**

Schroeter, B., Kappen, L., Schulz, F., **Long-term measurements of microclimatic conditions in the fruticose lichen *Usnea aurantiaco-atra* in the maritime Antarctic**, Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.63-69, With Spanish summary. Refs. p.67-69.

Results of microclimatic measurements of photon flux density, thallus temperature and photosynthetic activity in *Usnea aurantiaco-atra* from Livingston I. are presented for a 14-month period during 1992-93. The maximum of thallus temperature of +30.3°C was recorded in Dec. 1992; the minimum was -16.1°C in May 1992. Even during the winter season maximum temperatures exceeded 0°C every month, while minimum temperatures reached plus values only in Jan. and Dec. 1992. The daily sum of photon flux densities showed a pronounced seasonal trend; with less than 1 mol/m<sup>2</sup>/d in June and >18 mol/m<sup>2</sup>/d from Oct. 1992 to Jan. 1993. It is suggested that lichens in Antarctica can be photosynthetically active throughout the year, including the austral winter months when low light intensities limit severely the carbon gain. (Auth. mod.)

**B-57824**

Sojo, F., Valladares, F., Sancho, L.G., **Structural and ecophysiological variability of lichens** [Variabilidad estructural y ecofisiología ligada al microhábitat en el líquen antártico *Catillaria corymbosa*], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.71-76, In Spanish with English summary. 7 refs.

The authors have studied populations of *Catillaria corymbosa* from three different microhabitats, and have found that although the internal anatomy didn't reveal clear differences, the morphology of the specimens from each zone varied. Thus, the specimens from protected areas showed more thalli surface occupied by soredia, and a greater amount of chlorophyll than those from exposed areas. Likewise, they were able to retain water longer than the thallus from exposed zones, and showed a greater rate of net photosynthesis with a smaller compensation point of light. These structural and functional adaptations are considered to be directed towards compensating for the limited radiation and water supply that characterizes the small caves and protected places where some specimens of *C. corymbosa* live. (Auth. mod.)

**B-57825**

Valladares, F., Serey, I., Sancho, L.G., **Bryophyta and lichen colonization near a glacier on Robert I.** [Recolonización brioliquénica de áreas próximas a un glaciar en Isla Robert (Shetland del Sur, Antártida)], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.77-84, In Spanish with English summary. 8 refs.

The stage of vegetation development of a zone close to a glacial front on Robert I. was studied. The bryo-lichenic tundra exhibited a very low level of development, showing many dead bryophytes and lichens in the vicinity of the glacier, which could indicate the effects of a permanent snow cover and not of the glacier itself. Thalli of both a sorediate crustose lichen and of *Caloplaca subglobulata* sampled along various points situated at different distances from the glacier front showed no significant differences in average diameter. It is concluded that the last snow cover retreat occurred simultaneously over the whole area of the study, and that the bryo-lichenic communities further away from the glacier were significantly more developed than those closer to it. (Auth. mod.)

**B-57826**

Sánchez-Hoyos, M.A., Ascaso, C., Valladares, F., Sancho, L.G., **Effects of freezing on lichen photosynthetic pigmentation** [Efecto de largos períodos de congelación en el contenido en pigmentos y la ultraestructura del fotobionte de líquenes antárticos], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.85-90, In Spanish with English summary. 13 refs.

The evolution of the state of the photobiont of two antarctic lichens, *Ramalina terebrata* Hook and Tayl. and *Usnea antarctica* DuRoi, kept during 400 days under a temperature of -20°C and in the dark, was studied. The state of the photobiont was analyzed through the photosynthetic pigment content (chlorophylls and carotenoids) and the cellular ultrastructure. The photosynthetic pigments suffered a strong decrease throughout the storage period, being much more drastic in *R. terebrata* than in *U. antarctica*, specially during the first 40 days of storage. Nevertheless, the ultrastructural analysis didn't reveal significant changes from storage in the freezer, which reveals a great resistance of these organisms to low temperatures. This conservation of the cellular integrity is proposed as a recovery of the photobiont physiological parameters (namely, the recovery of the usual levels of photosynthetic pigments) during the new antarctic summer period. (Auth. mod.)

**B-57863**

Meyerdierks, D., **Ecophysiology of the dimethylsulfoniopropionate (DMSP) content of temperate and polar phytoplankton**



**communities in comparison with cultures of the coccolithophore *Emiliana huxleyi* and the antarctic diatom *Nitzschia lecointei*** [Zur Ökophysiologie des Dimethylsulfoniumpropionat (DMSP)-Gehaltes temperierter und polarer Phytoplanktongemeinschaften im Vergleich mit Laborkulturen der Coccolithophoride *Emiliana huxleyi* und der antarktischen Diatomee *Nitzschia lecointei*], *Berichte zur Polarforschung*, 1997, No.233, 198p. (Pertinent p.50-73), In German with English summary. Refs. p.178-195.

The cellular DMSP content of the antarctic diatom *Nitzschia lecointei* showed no trend in temperature dependence in field studies. Psychrophilic organisms such as *N. lecointei* have, in comparison with temperate species, a reduced metabolic activity. Therefore, prior acclimation may be essential for a temperature dependent DMSP content of these organisms. Polar and temperate pennate diatoms contain similar amounts of DMSP, whereas polar prymnesiophytes might have higher cellular DMSP concentrations than temperate species. DMSP synthesis of *Emiliana huxleyi* was light dependent. The cellular DMSP content is mainly influenced by light supply, and it is species specific with respect to cell age. During stationary growth, the antarctic diatom *N. lecointei* accumulated DMSP which might have occurred due to nutrient depletion. In contrast, *E. huxleyi* showed no DMSP accumulation during stationary growth, although this species was also nutrient limited in this growth phase. (Auth. mod.)

#### B-57865

Socal, G., Nöthig, E.M., Bianchi, F., Boldrin, A., Mathot, S., Rabitti, S., **Phytoplankton and particulate matter at the Weddell/Scotia Confluence (47°W) in summer 1989, as a final step of a temporal succession (EPOS project)**, *Polar biology*, July 1997, 18(1), p.1-9, Refs. p.7-9.

During Jan. 1989, phytoplankton biomass and species composition were studied in a north/south transect at the Weddell/Scotia Confluence. Results showed a diatom bloom in the Scotia Sea dominated by *Fragilariopsis cylindrus*, *Dactyliosolen antarcticus* and *Chaetoceros dictyota*. Low chlorophyll *a*/phaeopigments ratios and silicate concentrations suggested that this was an advanced bloom phase, probably linked to high grazing pressure. Minimum chlorophyll *a* values and particulate organic carbon were found at the Weddell/Scotia Front and in a subsurface layer of the Weddell Sea Water. In the Weddell Sea, a second surface maximum was found, but with a different species composition, with *Cryptomonas* sp. dominant. Results show a succession within the diatom community in the Weddell/Scotia Confluence Waters when comparing the three EPOS legs. In the Weddell Sea from spring to summer, nanoflagellates, with only a minor contribution from diatoms, persist over a long period with little change in the community structure. (Auth. mod.)

#### B-57866

Whiteley, N.M., Taylor, E.W., Clarke, A., El Haj, A.J., **Haemolymph oxygen transport and acid-base status in *Glyptonotus antarcticus* Eights**, *Polar biology*, July 1997, 18(1), p.10-15, Refs. p.14-15.

Haemolymph samples were withdrawn from routinely active male intermoult *Glyptonotus* held at  $0 \pm 0.5^\circ\text{C}$ , and analyzed for blood-gas and acid-base variables. In both the arterialized (a) and venous (v) haemolymph, over 50% of the oxygen was transported as dissolved oxygen. The maximum oxygen-carrying capacity of the haemocyanin was relatively low, accompanied by relatively low protein and  $[\text{Cu}^{2+}]$  levels indicating low circulating haemocyanin and concentrations. Arterialized haemolymph had a mean pH of  $7.88 \pm 0.02(6)$  and a bicarbonate level of  $12.95 \pm 0.80(6)$  mequiv/l, with small differences in  $\text{PCO}_2$  and pH between arterial and venous haemolymph. The non-bicarbonate buffering capacity of *Glyptonotus* haemolymph was low. Haemolymph [L-lactate] and [D-glucose] levels were similar in animals held in the laboratory and those sampled in Antarctica. The blood-gas and acid-base status of *Glyptonotus* haemolymph may be a reflection of the low and stable temperatures experienced by this antarctic crustacean. (Auth. mod.)

#### B-57867

Peña Cantero, A.L., García Carrascosa, A.M., Vervoort, W., **On *Antarctoscyphus* (Cnidaria, Hydrozoa), a new genus of antarctic hydroids and the description of two new species**, *Polar biology*, July 1997, 18(1), p.23-32, Refs. p.31-32.

ogy, July 1997, 18(1), p.23-32, Refs. p.31-32.

A new genus of the hydroid family Sertulariidae is established. Several species formerly assigned to the genus *Symplectoscyphus* Marktanner-Turneretscher, 1890 are included. A review of those species is given, including their main features along with some remarks. Two species new to science are added; the material of those species was collected in the Scotia Sea by the Spanish Antarctic Expedition "Antártida 8611". Present autecological data are discussed. (Auth.)

#### B-57868

Petz, W., **Ecology of the active soil microfauna (Protozoa, Metazoa) of Wilkes Land, East Antarctica**, *Polar biology*, July 1997, 18(1), p.33-44, Refs. p.42-44.

Active ciliates, testate amoebae, nematodes, rotifers and tardigrades were examined in fresh and preserved fellfield, moss and ornithogenic soil samples of Wilkes Land. Direct counting was used to investigate abundances, community structures and protozoan diversity. Twenty-six ciliate species (9 first records for continental Antarctica, one undescribed) and five testacean species (3 new records) were found. Two *Colpoda* species were active. Animal frequencies varied between habitats but every group occurred in at least 74% of the samples, rotifers (95%) and testaceans (92%) being most frequent. Highest abundances were recorded in moss: 354 ciliates/g dry soil (19 species), 671 testaceans (5 species); 513 nematodes, 1,311 rotifers and 4,607 tardigrades, which dominated. Rotifers were most abundant in the other habitats. The microfauna was not randomly distributed because individual numbers were often strongly inter-correlated. Water and organic matter content were relevant environmental parameters; air temperature and pH probably had indirect effects. (Auth.)

#### B-57869

Heinänen, A., Raateoja, M., Lahdes, E., Leppänen, J.M., **Relationships between bacterioplankton, chl *a* and temperature in Antarctic surface waters in summer**, *Polar biology*, July 1997, 18(1), p.62-69, Refs. p.68-69.

Spatial variations of bacterio- and phytoplankton were studied in order to compare their relationship in open-sea and coastal areas. Sampling was done quasi-synoptically south of the Antarctic Convergence in the Lazarev Sea and in the eastern part of the Weddell Sea during austral mid-summer. Thymidine incorporation rate and chl *a* correlated positively in both the open-sea and coastal samples. In the coastal area bacterial numbers also correlated positively with chl *a*. The scale of spatial resolution was not important for detecting empirical relationships between phytoplankton and bacterioplankton parameters. In the coastal area, the low bacterial biomass in relation to chl *a* concentration compared to other oceans, indicates that generalized relationships between these parameters are not valid in antarctic coastal waters. Grazing could not explain the discrepancy. The results suggest a strong coupling between phytoplankton and bacterioplankton, and that the bacterial assemblage in the coastal area was psychrophilic and well adapted to the prevailing low temperatures. (Auth. mod.)

#### B-57870

Slaterry, M., Hines, G.A., Watts, S.A., **Steroid metabolism in Antarctic soft corals**, *Polar biology*, July 1997, 18(1), p.76-82, Refs. p.81-82.

Whole body tissue preparations of the soft corals *Alcyonium paessleri* and *Clavularia frankliniana* were incubated *in vitro* with the radiolabelled precursors  $^3\text{H}$ -progesterone and  $^3\text{H}$ -androstenedione to determine steroidogenic capacity. Steroidal metabolites were identified using TLC, derivitization, and recrystallization techniques. The antarctic soft corals converted labelled precursors into a maximum of 5 metabolites. Both species exhibited similar steroidogenic capacity. Radioimmunoassays verified the presence of relevant concentrations of progesterone, androstenedione, testosterone, and estradiol in whole body extracts from each species of soft coral. *A. paessleri* and *C. frankliniana* actively converted precursors at temperatures up to  $10^\circ\text{C}$  above the ambient encountered by these species. Although similar steroidal compounds are produced in other phyla of benthic invertebrates, conversion rates for these soft corals are substantially lower. The role of these steroids is as yet unidentified. (Auth. mod.)



**B-57871**

Fontana, A., Scognamiglio, G., Cimino, G., **Dendrinolide, a new degraded diterpenoid from the antarctic sponge *Dendrilla membranosa***, *Journal of natural products*, May 1997, 60(5), p.475-477, 7 refs.

A new diterpenoid, named dendrinolide, was isolated together with the 9,11-dihydrogracilin A, from the Me<sub>2</sub>CO extract of the antarctic sponge *Dendrilla membranosa*. Its structure has been determined by interpretation of spectral data and comparison with a similar product previously found in the Mediterranean sponge *Spongionella gracilis*. (Auth.)

**B-57872**

Taylor, J.R.E., Place, A.R., Roby, D.D., **Stomach oil and reproductive energetics in Antarctic prions, *Pachyptila desolata***, *Canadian journal of zoology*, Mar. 1997, 75(3), p.490-500, With French summary. Refs. p.499-500.

Energy-provisioning rates and energy requirements of nestlings, as well as energy-expenditure rates of adults were studied in antarctic prions (*Pachyptila desolata*) on Bird I. Special emphasis was placed on investigating the role of stomach oil as an energy source for nestlings. Prion nestlings consumed, on average, 36.6 g food per day at the age of peak body mass. It is concluded that antarctic prions represent an intermediate position in the spectrum of procellariiform dependency on stomach oil during nestling rearing, with diving petrels (which do not produce stomach oil) at one extreme and storm-petrels at the other. Field metabolic rates of adults feeding nestlings, measured by means of the doubly labeled water technique, averaged 4.16 mL CO<sub>2</sub>/(g·h), or 391 kJ/day. It is suggested that this relatively low metabolic rate while foraging at sea is important for stomach oil formation, as it permits adults to allocate a greater proportion of energy from ingested food to their young. (Auth. mod.)

**B-57890**

Takahashi, K., Tanimura, A., Fukuchi, M., **Plankton sampling on board Shirase in 1983-1996—NORPAC standard net samples**, *Japanese Antarctic Research Expedition. JARE data reports*, Mar. 1997, No.224, 35p., 2 refs.

This is a report on phytoplankton sampling carried out on board the icebreaker *Shirase* during the JARE-25 to 37 cruises in the Indian Ocean. Several kinds of plankton nets were employed, and vertical hauls by NORPAC standard net (North Pacific standard net) were routinely carried out. This report presents the data records of the NORPAC standard net vertical hauls during 1983-1996. In addition, data of wet weight of plankton samples during JARE-23 and 24 are also presented.

**B-57892**

Allcock, A.L., Brierley, A.S., Thorpe, J.P., Rodhouse, P.G., **Restricted gene flow and evolutionary divergence between geographically separated populations of the Antarctic octopus *Pareledone turqueti***, *Marine biology*, July 1997, 129(1), p.97-102, Refs. p.101-102.

Samples of the antarctic octopus *Pareledone turqueti* were taken from three locations on the Scotia Ridge in the southern ocean. The genetic homogeneity of these populations was investigated using isozyme electrophoresis. Whilst panmixia appeared to be maintained around South Georgia ( $F_{ST}=0$ ) gene flow between this island and Shag Rocks, an island only 150 km away but separated by great depths, was extremely limited ( $F_{ST}=0.74$ ). These results are examined with respect to the discontinuous distribution of *P. turqueti* throughout Antarctica. An estimate of effective population size was also calculated ( $N_e=3600$ ). (Auth.)

**B-57893**

Croxall, J.P., Prince, P.A., Reid, K., **Dietary segregation of krill-eating South Georgia seabirds**, *Journal of Zoology*, July 1997, 242(3), p.531-556, Refs. p.547-550.

The diets of 6 of the main seabird species (2 petrels, 2 albatrosses, 2 penguins) breeding at Bird I. were studied simultaneously during the chick-rearing period in 1986. For 5 species, antarctic krill *Euphausia superba* was the main food (39-98% by mass); grey-headed albatrosses took mainly the ommastrephid squid *Martialia hyadesi* (71%) and only 16% krill. The size of the krill taken was similar between seabird species, although there were small but significant differences between penguins

and the other species. Sex and reproductive status of krill, however, was different between all seabird species, reflecting some combination of differences in foraging ranges, selectively by predators, or differences in escape responses of krill. For the krill-eating species, the rest of the diet varied substantially between species, comprising *Martialia* and nototheniid fish (black-browed albatross and, along with lanternfish, white-chinned petrel), lanternfish and amphipods (antarctic prion and macaroni penguin), and ice fish (gentoo penguin). (Auth. mod.)

**B-57894**

Bowman, J.P., Nichols, D.S., McMeekin, T.A., ***Psychrobacter glacincola* sp. nov., a halotolerant, psychrophilic bacterium isolated from antarctic sea ice**, *Systematic and applied microbiology*, June 1997, 20(2), p.209-215, Refs. p.214-215.

Two groups of halotolerant, strictly oxidative, non-motile bacterial strains with a distinct coccoidal morphology were isolated from predominantly congelation sea ice collected from the Vestfold Hills area and from anchor ice of the Amery Ice Shelf. One group of strains were found to be phenotypically similar to the species *Psychrobacter immobilis*. A second group of strains possessed an optimal temperature for growth of 13-15°C, and required seawater for optimal growth and failed to form acid from carbohydrates. These strains were also halotolerant growing in the presence of NaCl concentrations up to 1.8-2.1 M. Further characterization studies determined that the strains belonged to a single distinct taxon within the genus *Psychrobacter* which differed phenotypically and genotypically from other *Psychrobacter* species isolated from Antarctica and other environments. *Psychrobacter urativorans* ACAM 534<sup>T</sup> was the closest phylogenetic relative to the novel sea ice taxa in terms of 16S rDNA sequence similarity of 96.7%. The sea ice strains thus represent a novel species within the genus *Psychrobacter* with the proposed name, *Psychrobacter glacincola* n. sp. (Auth. mod.)

**B-57901**

Zimmermann, S., **Persistent organochlorines in high-antarctic fish** [Persistente chlororganische Verbindungen in hochantarktischen fischen], *Berichte zur Polarforschung*, 1997, No.232, 82p., In German with English summary. 102 refs.

Twenty-four chlorinated hydrocarbons from different classes were analyzed in 4 species of high-antarctic fish. *Aethotaxis mitopteryx*, *Pleuragramma antarcticum*, *Trematomus lepidorhinus*, all Nototheniidae, and *Chionodraco myersi*, Channichthyidae, were caught in the Weddell Sea and Lazarev Sea and show different modes of life. The latter 3 species are the dominant fish species of the region. It is unlikely that the burden of organochlorines will cause any toxic effects in high-antarctic fish yet. Nevertheless, with regard to the sensitive antarctic ecosystem, even small concentrations carry a high risk of harm for antarctic life. Atmospheric long-range transport is mainly responsible for organochlorine input to Antarctica. Environmental pollution in Antarctica should be closely monitored using standardized methods. For this purpose, the fish species in this study are very useful as bioindicators for organochlorine contamination. (Auth. mod.)

**B-57902**

Murphy, E., King, J., **Icy message from the Antarctic**, *Nature*, Sep. 4, 1997, 389(6646), p.20-21, 15 refs.

The author briefly reviews many recent studies on climate trends in the global warming process, including those implied by whale hunters' records. The hunters prowled the areas near the edge of the antarctic sea ice which gradually but steadily moved southward until the whale population became so depleted as to be no longer profitable and most whale hunting had stopped. Many other indicators of global warming appeared, but seldom in concert, so that no clear-cut positive pattern persisted to provide irrefutable evidence that global warming was a fact, not just a possibility. The one thing the authors conclude is that the whale population may have been so badly depleted as to be beyond recovery, and imply that the same state may exist in other parts of the ecosystem so as to put management of marine systems on the basis of continuing change rather than that of maintaining the *status quo*.

**B-57904**

Ohyama, Y., ed, Watanabe, K., ed, NIPR Symposium on Polar Biology, 18th, Tokyo, Dec. 6-7, 1995, **Proceedings of the NIPR**



**Symposium on Polar Biology, No.10**, Tokyo, National Institute of Polar Research, Feb. 1997, 209p., Refs. passim. For selected papers see B-57905 through B-57915 or 52-2 through 52-5.

This volume is a compilation of 17 full length papers, 11 of which are pertinent to Antarctica, presented at the 18th Symposium on Polar Biology held in Tokyo on Dec. 6-7, 1995. The aim of the Symposium was to introduce new results obtained in the polar and sub-polar regions covering marine and terrestrial biology, including the effects of snow- and ice-covers on antarctic phytoplankton. The program of the Symposium and an author index conclude the volume.

#### B-57905

Brandini, F.P., Baumann, M.E.M., **Potential role of melted "brown ice" as sources of chelators and ammonia to the surface waters of the Weddell Sea, Antarctica**, NIPR Symposium on Polar Biology, Proceedings. No.10, Tokyo, National Institute of Polar Research, Feb. 1997, p.1-13, Refs. p.12-13.

The effect of melted brown ice on the development of surface phytoplankton in the Weddell Sea was tested experimentally using natural surface populations and cultured diatoms. The growth of natural and cultured diatoms was enhanced after various additions of melted brown ice. EDTA was also used as a standard chelator in order to compare the chelating capacities of surface water and melted ice. It was demonstrated that surface waters are not limited by lack of chelating compounds, which may originate from ice communities. The role of melted brown ice as a potential source of either ammonium or chelators affecting phytoplankton development in marginal ice zones is discussed. (Auth. mod.)

#### B-57906

Takeda, S., Watanabe, K., **Growth response of Antarctic phytoplankton to iron enrichment**, NIPR Symposium on Polar Biology, Proceedings. No.10, Tokyo, National Institute of Polar Research, Feb. 1997, p.14-24, Refs. p.23-24.

Laboratory culture experiments were conducted with marine phytoplankton isolated from the Antarctic to determine the growth responses to iron enrichment. Batch cultures of 10 diatom clones and 2 *Phaeocystis* clones were grown under various total iron concentrations using trace metal clean techniques. These antarctic phytoplankton clones responded to iron enrichment by increasing their growth rates. *Odontella weissflogii* showed a linear increase with total iron. *Chaetoceros dictyota*, *Chaetoceros hendeyi*, *Nitzschia* sp. 1 and sp. 4, *Phaeocystis* sp. 1 and sp. 2 showed hyperbolic increase with total iron from 0.1 nM. *Corethron criophilum*, *Nitzschia* sp. 2, sp. 3, and sp. 5 showed hyperbolic increase with total iron from 0.2 nM, or a sigmoid pattern. The dependence of growth rates on cell volume size was insignificant. Results suggest that antarctic phytoplankton may respond differentially and significantly to changes of iron level even within the natural fluctuation in the southern ocean. (Auth. mod.)

#### B-57907

Goes, J.I., Handa, N., Suzuki, K., Taguchi, S., Hama, T., **Ultraviolet radiation induced changes in the production of organic compounds in Antarctic marine phytoplankton**, NIPR Symposium on Polar Biology, Proceedings. No.10, Tokyo, National Institute of Polar Research, Feb. 1997, p.25-38, Refs. p.36-38.

Experiments were conducted during Jan. 1995 in the Antarctic to examine the impact of enhanced solar ultraviolet-B radiation (UVBR) on the biosynthesis and composition of organic compounds in marine phytoplankton. Fatty acid concentrations increased in the presence of UVBR, mainly on account of a large increase in the content of saturated fatty acids within the cells; polyunsaturated fatty acids declined in cells exposed to UVBR. Amino acid concentrations were higher in the UVBR exposed samples, attributable largely to a UVBR induced increase in cellular concentrations of glutamic acid (Glutamic acid+glutamine) and aspartic acid. Monosaccharide constituents of cellular storage and structural carbohydrates, however, showed a decline in the cells exposed to UVBR. Except for the decline in structural monosaccharides, these changes in the patterns of organic compounds observed in antarctic phytoplankton were remarkably similar, but greater in magnitude in comparison to those observed in temperate phytoplankton exposed to UVBR. (Auth. mod.)

#### B-57908

Hayakawa, K., Handa, N., Fukuchi, M., **Changes in the fatty**

**acid composition of sinking particles during a phytoplankton bloom in the austral summer in Breid Bay, Antarctica**, NIPR Symposium on Polar Biology, Proceedings. No.10, Tokyo, National Institute of Polar Research, Feb. 1997, p.39-49, Refs. p.47-49.

Vertical fluxes of fatty acids were measured in sinking particles collected using a time-series sediment trap in Breid Bay during summer, Dec. 1985 to Feb. 1986. Major components of fatty acids indicated that the sinking organic matter was mainly derived from diatoms; the contribution of zooplankton to the sinking particles was small. Temporal variation in fatty acid fluxes indicated changes in the abundance and the growth activity of diatom communities in overlying waters. Ratios of unsaturated fatty acids to saturated fatty acids in the sinking particles increased in the exponential growth phase of the overlying diatom bloom as inferred from changes in the organic carbon and Chl *a* content of sinking particles, which reached their peak and started decreasing thereafter; relative abundance of 20:5 in total fatty acids increased in the peak fluxes. Results suggest that the increase of sinking fluxes was due to the accumulation of the diatom population. (Auth. mod.)

#### B-57909

Sasaki, H., et al, **Sporadic increase of particle sedimentation at the ice edge of the Antarctic Ocean during the austral summer 1994-1995**, NIPR Symposium on Polar Biology, Proceedings. No.10, Tokyo, National Institute of Polar Research, Feb. 1997, p.50-55, 18 refs.

Time-series sediment traps were deployed at depths of 537, 796, 1259, 1722 and 2727 m at the ice edge of the antarctic ocean (64°42'S, 139°58'E) from Dec. 26, 1994 to Jan. 20, 1995. During a short period from Jan. 7 to 9, a sporadic flux increase within a few days in terms of total dry weight of 774 mg/m<sup>2</sup>/d at 537 m was observed. The mass of sinking particles forming the flux maximum sank down to the deepest trap (2727 m) within 7-11 days, indicating that about 5% of these particles were transported downward to the bottom with the sinking rate of 199-313 m/d (mean 243 m/d). The considerable particle loss rate (13% [100/m]) below the mesopelagic layers in a short period suggests the occurrence of consumption processes induced by the sporadic supply of freshly produced particles from above. (Auth.)

#### B-57910

Kimura, N., Okada, Y., **Estimation of vertical profile of chlorophyll concentration around the Antarctic Peninsula derived from CZCS images by the statistical method**, NIPR Symposium on Polar Biology, Proceedings. No.10, Tokyo, National Institute of Polar Research, Feb. 1997, p.66-76, 13 refs.

The vertical profile of chlorophyll concentration in waters around the Antarctic Peninsula was estimated using a statistical method (Empirical Orthogonal Function Analysis: EOF Analysis), analyzing more than 200 ship observations from the surface to 150 m. Also a method is established to predict the vertical profile from CZCS-derived concentration. The comparison in terms of vertical profile demonstrates good agreement (relative error=40%) between CZCS prediction and ship-observation. The prediction by the model only needs one input, surface chlorophyll concentration, which can be easily derived from the satellite remote sensing data. (Auth.)

#### B-57911

Gibson, J.A.E., Swadling, K.M., Burton, H.R., **Interannual variation in dominant phytoplankton species and biomass near Davis Station, East Antarctica**, NIPR Symposium on Polar Biology, Proceedings. No.10, Tokyo, National Institute of Polar Research, Feb. 1997, p.77-89, Refs. p.88-89.

Phytoplankton biomass and speciation were monitored at an inshore site near Davis Station during 3 consecutive summer seasons, 1992-95. Four distinct phytoplankton assemblages were identified in which the dominant species were: *Phaeocystis* sp., an undescribed *Cryptomonas* species, *Thalassiosira dichotomica*, and a mixed assemblage containing *Fragilariopsis* spp. and *Nitzschia* spp. Little interannual consistency was found in either the timing of the appearance of the disappearance of the various assemblages. Similarly, the seasonal trends in biomass varied dramatically from year to year. Variations in the phytoplankton community is



ascribed, to some extent, to the random variation in a number of factors, including the date of fast ice break out, water column stratification, temperature and salinity, zooplankton grazing and strong winds. (Auth. mod.)

#### B-57912

Hosie, G.W., Cochran, T.G., Pauly, T., Beaumont, K.L., Wright, S.W., Kitchener, J.A., **Zooplankton community structure of Prydz Bay, Antarctica, January-February 1993**, NIPR Symposium on Polar Biology, Proceedings. No.10, Tokyo, National Institute of Polar Research, Feb. 1997, p.90-133, Refs. p.130-133.

Previous large scale surveys around Prydz Bay have identified the continental shelf edge as an area of rapid transition between 3 major zooplankton communities. One of these is dominated by the Antarctic krill *Euphausia superba*, located mainly along the continental shelf edge, usually between the offshore main oceanic community dominated by copepods and chaetognaths, and the neritic community dominated by *E. crystallorophias*. A survey in Jan-Mar. 1991 found similar community compositions but the krill community was restricted to the western part of the area. This study reports on the results of a repeat survey in Jan.-Feb. 1993 which extended the survey area to the west. Using the same multivariate analyses, the characteristic shelf and oceanic assemblages were again similar to previous surveys, but the krill community was restricted to 3 scattered sites. A number of hypotheses are presented to explain the apparent absence of krill. (Auth. mod.)

#### B-57913

Tanimura, A., Hoshino, K., Nonaka, Y., Miyamoto, Y., Hattori, H., **Vertical distribution of *Oithona similis* and *Oncaea curvata* (Cyclopoida, Copepoda) under sea ice near Syowa Station in the Antarctic winter**, NIPR Symposium on Polar Biology, Proceedings. No.10, Tokyo, National Institute of Polar Research, Feb. 1997, p.134-144, Refs. p.143-144.

Vertical distributions of two small cyclopoid copepods, *Oithona similis* and *Oncaea curvata*, were investigated under fast ice near Showa Station on July 1-2 in continuous darkness during the antarctic winter. All developmental stages from copepodite stage I (CI) to adults of two species occurred homogeneously throughout the water column; and no marked diel vertical migration was observed. Their homogeneous distribution pattern and non-migrating behavior suggest some selective advantages for surviving in the antarctic winter: reduction of the energy cost, effective utilization of the limited food resources, and minimizing the population predation. (Auth.)

#### B-57914

Sugizaki, M., Lucchiari, P.H., Malucelli, M.I.C., Bacila, M., **Respiration and oxidative phosphorylation of mitochondria from tissues and organs of Antarctic fish**, NIPR Symposium on Polar Biology, Proceedings. No.10, Tokyo, National Institute of Polar Research, Feb. 1997, p.145-152, 10 refs.

Research has been carried out on the effect of temperature on the physiological properties of mitochondria isolated from liver, cardiac muscle and encephalon of the antarctic fish *Notothenia neglecta*. Mitochondria were obtained in a medium containing 0.25 M mannitol, 0.075 M sucrose,  $10^{-3}$  M EDTA, and  $10^{-2}$  M TRIS, in  $10^{-3}$  M phosphate buffer, pH 7.4. All assays were carried out by means of a polarograph assembled with an oxygen electrode possessing a temperature sensor. Respiration rates, oxidative phosphorylation and respiratory control values were assayed in regard to the effect of temperature. All preparations of liver, cardiac muscle and encephalon mitochondria displayed a very efficient respiration mechanism at 1°C. No general pattern for the influence of temperature increase has been found in those preparations. On the other hand, encephalon mitochondria displayed an efficient system for ATP generation by oxidative phosphorylation, but sensitive to temperature increase. (Auth.)

#### B-57915

Kappen, L., Schroeter, B., **Activity of lichens under the influence of snow and ice**, NIPR Symposium on Polar Biology, Proceedings. No.10, Tokyo, National Institute of Polar Research, Feb. 1997, p.163-168, 16 refs.

A major aim of the investigations is to explain the adaptation of vegetation to the peculiar environmental conditions in polar regions. The concept describes the main limiting and favorable factors influencing photosynthetic production of cryptogams, mainly lichens. Snow and ice—usually stress factors to the activity of plants—can be effectively used by lichens because of their poikilohydrous nature. In the continental antarctic as well as in the high arctic regions the favorable light and temperature conditions during the summer may not be as profitable to the productivity of lichens as expected because water is deficient. The authors established measuring systems that automatically recorded micro-environmental parameters and lichen activity over the whole annual period, and investigated physiological responses of lichens to the environmental conditions with experiments mainly carried out in the field. (Auth. mod.)

#### B-57916

Dafner, E., **Primary production and development of phytoplankton in the Atlantic sector of the southern ocean**, *Geographical Journal*, Jan. 1997, 41(1), p.5-15, Refs. p.12-15.

Based on the compilation of numerous data obtained with various methods, the paper discusses primary productivity (PP) in the Atlantic sector of the southern ocean. The distribution of PP values follows the law of zonality: PP values increase southward from the waters of the Subtropical frontal zone to the antarctic coast. Deviations from zonality law were observed in the waters of frontal zones, on the Patagonia Shelf, and in neritic areas. The spatial heterogeneities in PP distribution is determined by structural particularities of the horizontal circulation of waters and the respective distribution of different water masses and their modifications. Factors determining PP in the region, as well as correlation of PP and productivity on higher trophic levels, are discussed. (Auth. mod.)

#### B-57923

Gómez, I.M., **Life strategy and ecophysiology of antarctic macroalgae**, *Berichte zur Polarforschung*, 1997, No.238, 99p., With German summary. Refs. p.80-98.

The present report summarizes the results from a series of publications dealing with eco-physiology of antarctic marine macroalgae, with particular reference to brown algae. In order to characterize metabolic activity, growth, photosynthetic activity, carbon assimilation and allocation of organic compounds were determined using cultured and field plants of selected species. Data are examined with respect to morpho-functional characteristics, seasonality and depth zonation and are compared with related subjects from previous surveys. To put this information into a perspective, a general overview of the future topics of investigation is briefly outlined at the end of each chapter. (Auth. mod.)

#### B-57924

De la Maza, A., Parra, J.L., Lopez, O., Congregado, F., Bozal, N., Guinea, J., **Assembly properties of a glycoprotein produced by *Pseudoalteromonas antarctica*, NF<sub>3</sub>**, *Journal of colloid and interface science*, Aug. 15, 1997, 192(2), p.286-293, 31 refs.

Increasing amounts of glycoprotein (GP) in water led to an abrupt decrease in the dispersion surface tensions up to a GP concentration of about 0.20 mg/ml, followed by an almost constant surface tension value. The size distribution curves of the aggregates formed always showed a bimodal distribution. The mean size of these two aggregates increased as GP concentration increased reaching in both cases almost a constant value also for 0.20 mg of GP/ml of water. TEM images of unsonicated aqueous GP dispersions at concentrations lower and higher than 0.20 mg/ml always showed the coexistence of concentric multilamellar and small unilamellar aggregates, the small particles being the dominant class in the first case. Sonication of these dispersions revealed that each lamella of the initial multilamellar structures was made up of various subunits of coiled coil, whereas the smaller particles were not composed of these subunits. Profiles from digitalized TEM images of unsonicated and sonicated dispersions confirm that each lamella of large aggregates was composed of three subunits. (Auth. mod.)

#### B-57948

Guinet, C., et al, **Foraging behaviour of satellite-tracked king penguins in relation to sea-surface temperatures obtained by satellite telemetry at Crozet Archipelago, a study during three austral summers**, *Marine ecology progress series*, Apr. 30, 1997,



150(1-3), p.11-20, Refs. p.19-20.

During the austral summer the foraging range of breeding king penguins was restricted to the Polar Frontal Zone, limited to the south by the Polar Front and to the north by the Subantarctic Front. Most birds travelled towards the colder water situated south of Crozet Is., while other birds moved east to warmer water. Birds travelling south spent more time than expected in the cold waters generally associated with the Polar Front. Birds travelling east reached the southern limit of the Subantarctic Front (sea-surface temperature between 8 and 10°C). As the breeding season progressed, the Polar Front moved further south, out of the range of the king penguins, especially those with a newly hatched chick, that were limited in the amount of time that they could spend at sea. King penguins breeding at Crozet Is. may choose between 2 strategies: some birds forage towards the Subantarctic Front, but most travel south towards the Polar Front. (Auth. mod.)

#### B-57949

Bost, C.A., et al, **Foraging habitat and food intake of satellite-tracked king penguins during the austral summer at Crozet Archipelago**, *Marine ecology progress series*, Apr. 30, 1997, 150(1-3), p.21-33, Refs. p.32-33.

The authors investigated the movements at sea, time spent per oceanic sector, food intake, and diet of king penguins *Aptenodytes patagonicus*, at the Crozet Is., as a function of the position of major frontal zones. Fifteen trips at sea were monitored using satellite transmitters over 3 austral summers (1992 to 1994). The at-sea distribution of king penguins was closely related to the localization of major hydrographic frontal systems. Intense prospecting areas were observed mainly in zones corresponding to the northern limit of the Polar Front, southern limit of the Subantarctic Front, and a zone between 47° and 48°S. During trips directed south, 2 distinct phases based on travelling speed were detected. The myctophids *Electrona carlsbergi*, *Krefftichtys anderssoni* and *Protomyctophum tenisoni* dominated the diet. The estimated average amount of food ingested per day at sea was 2.4 kg. Between 17 and 64 kg of food was captured during 7 to 25 d at sea. Approximately 80% of the food intake occurred during the first phase of the trip. (Auth. mod.)

#### B-57950

Brierley, A.S., Watkins, J.L., Murray, A.W.A., **Interannual variability in krill abundance at South Georgia**, *Marine ecology progress series*, Apr. 30, 1997, 150(1-3), p.87-98, Refs. p.95-98.

The authors describe a new acoustic survey program to monitor krill abundance in the South Georgia region. They present biomass estimates for 2 survey boxes, located over the shelf-break to the northeast and northwest of the island, derived from the first of these surveys conducted in Jan. 1996, and contrast these with the most recent previous estimates for the region obtained in Jan. 1994. Weighted mean krill density (and weighted variances) estimates for the 1996 surveys were high compared with those obtained in Jan. 1994. The greater than 20-fold difference between surveys reveals a very large interannual variability in krill abundance at South Georgia. In 1994 the low abundance resulted in greatly reduced breeding success in most habitual krill predator species there. In the 1996 season, however, breeding success of these species was normal. Instantaneous estimates of krill abundance using acoustic techniques are therefore consistent with measurements from predators. (Auth. mod.)

#### B-57951

Atkinson, A., Schnack-Schiel, S.B., Ward, P., Marin, V., **Regional differences in the life cycle of *Calanoides acutus* (Copepoda: Calanoida) within the Atlantic sector of the Southern Ocean**, *Marine ecology progress series*, Apr. 30, 1997, 150(1-3), p.99-111, Refs. p.110-111.

The abundance and life cycle of *Calanoides acutus* data, from 205 stations (1928 to 1992), were pooled into 3 regions: the Scotia Sea (SS), the Weddell-Scotia Confluence/northern Weddell Sea area (WSC) and the Eastern Weddell Sea (EWS). *C. acutus* was rarer in the vicinity of the WSC than in the southern part of the SS or in the EWS. In all 3 regions seasonal vertical migration characterized the populations, but their appearance in the surface waters of the SS was 1 to 2 mo earlier than in the EWS, and was of longer duration. Because *C. acutus* is herbivorous, this is presumably a response to the timing of summer primary production. Despite the contrasting environments, spring/summer development rates were

similar in all 3 regions, with moulting from copepodid CI to CIV taking approx 1.5 mo. Based on summer moulting rates, winter stage structure and mortality rates, the life cycle appears to be completed normally within 1 yr in all 3 regions, but it is suggested that the shorter summer growth season in the EWS results in a small proportion of the population taking 2 yr to reach adulthood. (Auth. mod.)

#### B-57952

Olsson, O., **Effects of food availability on fledging condition and post-fledging survival in king penguin chicks**, *Polar biology*, Sep. 1997, 18(3), p.161-165, 21 refs.

Effects of summer food shortage on king penguin *Aptenodytes patagonicus* chicks were studied at South Georgia. Two cohorts were compared, fledging in the austral summers of 1992 and 1994 when availability of food was judged good and poor, respectively. The former cohort had a higher pre-fledging mean mass, fledged earlier, and a higher proportion was re-sighted within 2 years of fledging. Within 4 years, 47% of the former cohort had been resighted, in addition, one was observed at the Falkland Is., and 22% had bred in their colony of origin. The re-sighted chicks of the 1992 cohort fledged earlier than those not re-sighted, but it remains unclear if they were heavier at fledging. All chicks in this study were marked with both transponders and flipper bands and no losses of any markings were found (controlled up to 4 years afterwards). Therefore, data on chick post-fledging survival and recruitment were not adjusted for losses of markings, as has been done in other studies. (Auth. mod.)

#### B-57953

Todd, C.M., **Respiratory metabolism in two species of carabid beetle from the sub-Antarctic island of South Georgia**, *Polar biology*, Sep. 1997, 18(3), p.166-171, 32 refs.

The influence of feeding state on cold-adapted metabolism was investigated in the adults of 2 carabid beetles, *Trechisibus antarcticus* and *Ooapterus soledadinus* (Coleoptera:Carabidae), which have been introduced to South Georgia. The metabolic rates in both fed and starved *O. soledadinus* and *T. antarcticus* were determined at 8 temperatures ranging from 0 to 35°C. There was no significant difference in the metabolic rates between the fed and starved animals of each species. In each of the 4 experimental groups there was a strong positive correlation between metabolic rate and temperature, with the highest increase occurring between 0 and 5°C. In contrast, the metabolic rate was significantly negatively correlated with initial live weight of the beetles at most temperatures. The results are discussed comparatively with other species and against a background of the ecology of the two carabids at South Georgia. (Auth. mod.)

#### B-57954

Slattery, M., Bockus, D., **Sedimentation in McMurdo Sound, Antarctica: a disturbance mechanism for benthic invertebrates**, *Polar biology*, Sep. 1997, 18(3), p.172-179, Refs. p.178-179.

A slumping event occurred on permanent transect lines from 12- to 30-m depth located at McMurdo Sound in 1993. The disturbance had a particularly significant impact on the soft coral *Alcyonium paessleri*, which resulted in 84% colony mortality downslope from the slump site compared to an average annual mortality rate of 14% on control transects. Laboratory experiments with *A. paessleri* colonies under conditions of periodic sediment resuspension indicate that the soft corals are susceptible to this form of disturbance. Observations suggest they are capable of shedding fine silt in the laboratory, which might explain the presence of *A. paessleri* in soft-sediment sites around McMurdo Sound. However, scarring by larger gravel in laboratory assays was slow to heal and may account for much of the colony mortality observed. (Auth. mod.)

#### B-57955

Pakhomov, E.A., Verheye, H.M., Atkinson, A., Laubscher, R.K., Taunton-Clark, J., **Structure and grazing impact of the mesozooplankton community during late summer 1994 near South Georgia, Antarctica**, *Polar biology*, Sep. 1997, 18(3), p.180-192, Refs. p.191-192.

Mesozooplankton abundance, community structure and grazing impact were determined during Feb.-Mar. 1994 at 8 oceanic stations near South Georgia using samples collected in the upper 200-m and 100-m layer. The zooplankton abundance was generally dominated by copep-



odite stages C3-C5 of 6 copepod species. Most copepods had large lipid sacs. All copepods accounted for 41-98% of total zooplankton abundance. Juvenile euphausiids were the second most important component contributing between 1 and 20% of total abundance. Pteropods accounted for 44 and 53% of total abundance. Gut pigment contents and feeding activity of copepod species were low. Daily mesozooplankton grazing impact varied widely. The highest grazing impact was found northeast of the island coincident with the lowest phytoplankton biomass and primary production levels. (Auth. mod.)

#### B-57956

Lecointre, G., Bonillo, C., Ozouf-Costaz, C., Hureau, J.C., **Molecular evidence for the origins of Antarctic fishes: paraphyly of the Bovichtidae and no indication for the monophyly of the Notothenioidei (Teleostei)**, *Polar biology*, Sep. 1997, 18(3), p.193-208, Refs. p.202-203.

Complete nucleotide sequence of the D2 and D8 domains of 28S rDNA, for 6 notothenioids and a collection of 6 outgroup taxa, including the Trachinoidei and Zoarcoidei, was determined. Different outgroups and different weighing schemes support the inference that *Pseudaphritis* is closer to the rest of the Notothenioidei than the *Cottoperca* and *Bovichtus*. Molecular data show that the Bovichtidae are paraphyletic. The data provide no indication of the monophyly of the Notothenioidei in its classical sense. Most of the homoplasy is due to outgroup sequences and interrelationships of outgroups are unresolved. Some morphological synapomorphies shared by *Pseudaphritis* and the rest of the non-bovichtid Notothenioidei are proposed. (Auth. mod.)

#### B-57957

Scapigliati, G., Chausson, F., Cooper, E.L., Scalia, D., Mazzini, M., **Qualitative and quantitative analysis of serum immunoglobulins of four Antarctic fish species**, *Polar biology*, Sep. 1997, 18(3), p.209-213, 19 refs.

Immunoglobulins from the antarctic fish species *Trematomus bernacchii*, *Trematomus hansonii*, *Trematomus newnesi*, and *Chionodraco hamatus* were analyzed in whole serum and after purification by affinity chromatography on protein A-sepharose. Heterogeneity in mass of both heavy and light chains was observed in all species. By using a polyclonal antibody raised against sea bass immunoglobulins, cross-reactivity was observed with heavy and light chains of all species. With this antibody, an indirect enzyme-linked immunosorbent assay (ELISA) was developed and results showed the relative immunoglobulin concentration in sera of the antarctic fish species considered, using as standard sea bass immunoglobulins. (Auth. mod.)

#### B-57958

Bengtson, J.L., Stewart, B.S., **Diving patterns of a Ross seal (*Ommatophoca rossii*) near the eastern coast of the Antarctic Peninsula**, *Polar biology*, Sep. 1997, 18(3), p.214-218, 27 refs.

In Jan. 1987 the authors documented the diving patterns of a female Ross seal (*Ommatophoca rossii*) in the marginal pack-ice zone near the eastern coast of the Antarctic Peninsula for 2 days, using a microprocessor-based time-depth recorder. The seal hauled out during the day and dived continually when in the water at night. Dives averaged 110 m deep and 6.4 min long; the deepest dive was 212 m and the longest 9.8 min. Dives were deepest near twilight and shallowest at night; this pattern suggests that the seal's prey, presumably mid-water squid and fish, may have been making vertical migrations or changing predator-avoidance behavior in response to diel light patterns. The dives of this Ross seal were substantially deeper, on average, than those of crabeater seals (*Lobodon carcinophagus*), which forage in the same areas on antarctic krill (*Euphausia superba*). (Auth.)

#### B-57959

Casaux, R., Coria, N., Barrera-Oro, E., **Fish in the diet of the antarctic shag *Phalacrocorax bransfieldensis* at Laurie Island, South Orkney Islands**, *Polar biology*, Sep. 1997, 18(3), p.219-222, 18 refs.

The analysis of 29 stomach contents collected from a colony close to Pirie Peninsula on Laurie I., from Jan. 2 to Feb. 18, 1995, showed that fish were by far the most important prey of the antarctic shag *Phalacrocorax bransfieldensis*, followed by octopods, decapods and gammarids. The fish

*Notothenia coriiceps* constituted the bulk of the diet; however, its importance decreased by the end of the study, when *Lepidonotothen nudifrons* was the most important prey. The composition of the stomach contents varied throughout the breeding season according to changes in the chicks' energetic demands; as chicks grew older the adults increased the mass of the loads carried to the nests, preying on larger fish, a phenomenon also observed at the South Shetland Is. (Auth.)

#### B-57960

Gollasch, S., **Planktonic ostracods (Crustacea) along the coasts of the South Shetland Islands King George and Elephant (Antarctic Ocean) during spring season 1994**, *Polar biology*, Sep. 1997, 18(3), p.223-226, 15 refs.

Ostracod samples were taken from coastal waters of King George and Elephant islands. The population structure of the planktonic ostracods in the upper 200-m water column is described. In total 77 samples were taken quantitatively by RMT-1 hauls predominantly containing *Alacia hettacra*, *A. belgicae* and *Metaconchoecia isocheira*. The dominance of A2, A1 and adult stages supports Kock's conclusion of an upward-directed ontogenetic migration. (Auth.)

#### B-57961

Merino, S., Barbosa, A., Moreno, J., Potti, J., **Absence of haematozoa in a wild chinstrap penguin *Pygoscelis antarctica* population**, *Polar biology*, Sep. 1997, 18(3), p.227-228, 15 refs.

Blood samples were obtained from foot veins of chinstrap penguins breeding in the Vapour Col rookery on Deception I. during the summer of 1994-95. The authors sampled 30 breeding and 10 moulting adults, and 58 nestlings of about 45 days of age. No haematozoa were detected in the 40 adult and 58 nestling wild chinstrap penguins (*Pygoscelis antarctica*) examined by blood smear. (Auth. mod.)

#### B-57966

Block, W., Harrison, P.M., **Collembolan water relations and environmental change in the maritime Antarctic**, *Global change biology*, Oct. 1995, 1(5), p.347-359, Refs. p.358-359.

The present study analyzes four years data on the water content of a species of Collembola from the maritime Antarctic to answer the following questions: is the field water content of such insects limited by the availability of water in their habitats and does it constitute an environmental stress; does water content vary seasonally, and why; and is there a relationship in the longer term between the water status of Collembola and environmental change?

#### B-57967

Marsigliante, S., Acierno, R., Maffia, M., Muscella, A., Vinson, G.P., Storelli, C., **Immunolocalisation of angiotensin II receptors in icefish (*Chionodraco hamatus*) tissues**, *Journal of endocrinology*, Aug. 1997, 154(2), p.193-200, Refs. p.199-200.

The presence and distribution of Ang II-R in target tissues of the antarctic teleost icefish (*Chionodraco hamatus*) was studied. Immunocytochemistry of intestine and gill sections showed that the antibody bound to uniformly distributed intracellular sites and cell surface membranes in absorptive cells in the intestine and chloride and pavement cells in the gills. It also stained endothelium and both the longitudinal and circular layers of smooth muscle cells in the intestine. In the kidney, only the tubules in the trunk stained positively while the head (atubular part of the kidney) was negative. In kidney tubules, in contrast with other tissues, the receptor was most concentrated in the cytoplasm underlying the basolateral membranes, with somewhat weaker staining beneath the apical cell membrane. Immunoblotting identified a single component from trunk kidney preparations that focused at pI 5.9 in isoelectric focusing gels and showed a molecular mass of 75 kDa in SDS-polyacrylamide gels. The data suggest that, as in other teleosts, Ang II has a physiological role in the icefish. (Auth. mod.)

#### B-57968

Everson, I., Kock, K.H., Parkes, G., **Interannual variation in condition of the mackerel icefish**, *Journal of fish biology*, July 1997, 51(1), p.146-154, 18 refs.



Mackerel icefish *Champsocephalus gunnari* are widespread on the South Georgia shelf. Analysis of condition indicated a strong interannual variation. High condition indices, indicative of good feeding conditions, were present when krill were abundant in the region. Years when krill were scarce and condition index was consequently low, were consistent with years when indices from land-based krill predators also indicated that krill were scarce. (Auth.)

#### B-57986

Acierno, R., Agnisola, C., Tota, B., Sidell, B.D., **Myoglobin enhances cardiac performance in antarctic icefish species that express the protein**, *American journal of physiology*, July 1997, 273(1)pt 2, p.R100-R106, 19 refs.

Some icefish species express myoglobin (Mb) in their heart ventricles. It is unknown whether Mb in those species in which it is present represents an evolutionary relic or has functional significance. This problem was addressed by comparing mechanical performance of isolated, perfused hearts from 2 species of icefish in which Mb is either present (*Chionodraco rastrispinosus*) or is absent (*Chaenocephalus aceratus*). Hearts were challenged with increasing afterload under conditions of defined basal flow in both the presence and absence of 5 mM sodium nitrite, a Mb poison. Unlike hearts from *C. aceratus*, which were unable to maintain a constant cardiac output under pressure loading, those from *C. rastrispinosus* retained a constant flow up to 3.5 kPa afterload. At the upper range of power outputs, hearts of Mb-lacking *C. aceratus* display greater oxygen utilization than those of Mb-containing *C. rastrispinosus*. Poisoning of Mb significantly impaired the ability of *C. rastrispinosus* hearts to face pressure loading without reduction in flow, whereas those of *C. aceratus* were refractory to the treatment. The results strongly support a functional role for Mb in the former species. (Auth. mod.)

#### B-57994

Stoecker, D.K., Gustafson, D.E., Merrell, J.R., Black, M.M.D., Baier, C.T., **Excystment and growth of chrysophytes and dinoflagellates at low temperatures and high salinities in antarctic sea-ice**, *Journal of phycology*, Aug. 1997, 33(4), p.585-595, 45 refs.

Extreme environmental conditions have been thought to limit algal growth in the upper sea ice. In McMurdo Sound chrysophyte statocysts (stomatocysts) and dinoflagellate hypnozygotes (resting cysts) overwinter in first- and second-year fast ice exposed to temperatures of -20°C or lower. In early Nov., when temperatures in the upper ice are <-8°C and brine salinities are >126 psu, dinoflagellate cysts activate and shortly thereafter excyst. During early Nov., chrysophyte statocysts also begin to excyst. Net daily primary production occurs in the sea ice brine at temperatures as low as -7.1°C, at brine salinities as high as 129 psu. High densities of physiologically active cryo- and halotolerant algae can occur in the upper fast ice under extreme conditions of temperature and salinity. (Auth.)

#### B-57995

Gosink, J.J., Herwig, R.P., Staley, J.T., **Octadecabacter arcticus** gen. nov., sp. nov. and *O. antarcticus*, sp. nov., nonpigmented, psychrophilic gas vacuolate bacteria from polar sea ice and water, *Systemic and applied microbiology*, Aug. 1997, 20(3), p.356-365, 37 refs.

Heterotrophic, psychrophilic, gas vacuolate bacteria were recovered from arctic and antarctic sea ice and water. Cellular fatty acid analysis was used to group these isolates. One group herein described as the new genus *Octadecabacter*, had octadecenoic acid (18:1) in excess of 70% of their total fatty acid content. Phylogenetic analysis of the 16S rRNA of several strains from this group revealed that they were members of the  $\alpha$  Proteobacteria and were most closely related to the genus *Roseobacter*. Further phenotypic and genotypic tests showed that these strains can be distinguished from *Roseobacter* on the basis of low levels of DNA/DNA hybridization, lack of bacteriochlorophyll *a*, and because they are psychrophiles. *Octadecabacter* gen. nov., contains both a north polar species, *O. arcticus* sp. nov. str. 238, and a south polar species, *O. antarcticus* sp. nov. str. 307. This genus may be useful for examining the extent of procaryotic biogeographic dispersal. (Auth.)

#### B-58040

Vasiliev, V.I., **State of zooplankton in the South Polar Frontal Zone of the Atlantic Ocean in autumn**, *Moscow University. Biological sciences bulletin*, 1995, 50(2), p.39-49, Translated from Vestnik Moskovskogo Universiteta. Biologiya. 3 refs.

Data on the quantitative distribution of seston and several zooplankton species in the region of South Georgia showed certain differences in its abundance between June 1988 and 1989, attributed to variable development of phytoplankton present at some stations during the warm autumn of 1988. In the northwest part of the study area, the meander of warm waters was noted with subantarctic and wide tropical zooplankton species represented. (Auth. mod.)

#### B-58043

Putzke, J., Pereira, A.B., **Macroscopic fungi from the South Shetland Islands, Antarctica, Santiago de Chile**. *Instituto Antártico Chileno. Serie científica*, 1996, No.46, p.31-39, With Spanish summary. 13 refs.

Results obtained in the study of macroscopic fungi collected on Nelson, King George and Elephant islands, during the austral summers 1986-1989 and 1991-1992, are presented. Descriptions and illustrations of *Lamprospora miniatopsis* (collected on Nelson and Elephant islands), *Galerina perrara* (Elephant I.), *Galerina moelleri* (King George I.) and *Omphalina antarctica* (King George and Elephant islands) are also presented. The first three species are new to the region. (Auth. mod.)

#### B-58044

Lloris S., D., Pequeño R., G., Rucabado, J., Lamilla G., J., **Harpagifer Richardson fish from the Falkland Is.** [El género *Harpagifer* Richardson, 1844, en el extremo sur de América (Pisces, Harpagiferidae)], *Santiago de Chile. Instituto Antártico Chileno. Serie científica*, 1996, No.46, p.41-58, In Spanish with English summary. Refs. p.56-58.

The genus *Harpagifer* Richardson, 1844, endemic to the Southern Hemisphere, presents problems regarding taxonomic determination of infrageneric units. This study works in a regional frame work of the southern tip of South America and the Falkland Is., with methodologies based on numerical and egg analysis. More than 300 specimens were studied; two subspecies are found: *Harpagifer bispinis bispinis* (Schneider, 1801) from the Magellan Strait and adjacent channels, and *Harpagifer bispinis palliolauts* Richardson, 1844, which is found in the same sector and also at the Falkland Is. A key to recognize these subspecies, using characteristics not formerly used, is given. The systematic-taxonomic context is discussed, with special reference to the geographic distribution of the genus. (Auth. mod.)

#### B-58047

Quilhot, W., **Preliminary data on the accumulation of usnic acid related to ozone depletion in two antarctic lichens**, *Santiago de Chile. Instituto Antártico Chileno. Serie científica*, 1996, No.46, p.105-111, With Spanish summary. Refs. p.109-111.

The absorbing properties of UV radiation of lichen phenols agree with their photoprotector capacity determined by *in vivo* and *in vitro* methods. The photostability that characterizes these compounds makes it possible to study the relations between the UV absorbers and ozone levels in different time scales. Usnic acid is the most frequent UV-B absorber in antarctic lichens. In *Neuropogon aurantiaco-ater* (Jacq.) I.M. Lamb. and *Ramalina terebrata* Hook. et Tayl., collected in Antarctica over a period of 30 years, the highest concentrations of usnic acid were observed when the ozone diminished to critical values. (Auth.)

#### B-58051

Fariña R., J.M., **Madrid Protocol and environmental impact studies** [El Protocolo de Madrid y los estudios de impacto ambiental en la Antártica], *Santiago de Chile. Instituto Antártico Chileno. Serie científica*, 1996, No.46, p.145-160, In Spanish with English summary. Refs. p.158-160.

The main aspects developed for the environmental conservation in Antarctica, with special emphasis on the Protocol to the Antarctic Treaty on Environmental Protection, are reviewed. Based on an analysis of the methodologies proposed in the Protocol and on a preliminary Manual



issued in Chile for the application of this document, a number of comments and suggestions for the improvement of both are proposed. This work represents a contribution for the development of methodologies for environmental impact assessment in Antarctica. (Auth.)

#### B-58053

Gemmell, N.J., Allen, P.J., Goodman, S.J., Reed, J.Z., **Interspecific microsatellite markers for the study of pinniped populations**, *Molecular ecology*, July 1997, 6(7), p.661-666, 27 refs.

Microsatellites have rapidly become the marker of choice for a wide variety of population genetic studies. Here the authors describe 20 pinniped microsatellite markers which have been tested across 18 pinniped species. The majority of these markers have broad utility in all pinnipeds and provide a strong base for detailed population genetic studies in the Pinnipedia. The southern sea lion (*Otaria byronia*) and the antarctic seal (*Arctocephalus gazella*) represent the far southern branch of pinnipeds in this study. (Auth. Mod.)

#### B-58054

Vernet, M., Smith, R.C., **Effects of ultraviolet radiation on the pelagic antarctic ecosystem**, Effects of ozone depletion on aquatic ecosystems, edited by D.P. Häder, Austin, TX, R.G. Landes Company, 1997, p.247-265, 126 refs.

#### DLC QH545.O94H33 1997

The overall effect of UVR on the ecosystem needs to include relevant feedback mechanisms which can diminish, and sometimes reverse, deleterious effects on population growth. It has been speculated that UVR can increase iron-limited phytoplankton populations by photoinduced reduction of  $\text{Fe}^{3+}$  to  $\text{Fe}^{2+}$ , a more soluble form of iron and readily available for algal and bacterial uptake. An equally positive feedback can be attributed to diminished grazing by zooplankton. Thus, energy flow among the trophic levels can decrease as a result of damage to a certain trophic level, but overall biomass and ecosystem production might remain relatively unchanged. Similar positive and negative feedbacks associated with UVR are related to the dissolved organic matter (DOM) pool, known to be recycled by bacterial activity. Although it could be expected that bacterial production in antarctic surface waters would decrease when exposed to UVR, this effect can be counteracted by increased substrate nutrient availability. (Auth. mod.)

#### B-58057

Agnew, D.J., **CCAMLR Ecosystem Monitoring Programme**, *Antarctic science*, Sep. 1997, 9(3), p.235-242, Refs. p.241-242.

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) has implemented an Ecosystem Monitoring Programme (CEMP) for the antarctic marine environment. Fully implemented since 1987, the program involves monitoring selected predator, prey and environmental indicators of ecosystem performance. The central aim of the program is the detection of changes in these indicators and the interpretation as to whether these changes are due to natural events or the harvesting of marine living resources. The core of the program is the acquisition, centralized storage and analysis of standardized monitoring data combined with a strong emphasis on empirical and modelling based research. Since 1987, CEMP has collected data on 6 bird and seal species at 15 sites around the Antarctic. Up to 14 parameters of predator performance and 10 parameters of prey and environmental performance are collected at each site. (Auth. mod.)

#### B-58058

Huin, N., Prince, P.A., **Diving behaviour of the grey-headed albatross**, *Antarctic science*, Sep. 1997, 9(3), p.243-249, 22 refs.

Foraging grey-headed albatrosses spent 86% of the night but only 20% of the day sitting on the sea; most diving activity occurred during daylight. During the brood-guard period of nesting, peaks of diving activity occurred at midday and dusk. During the subsequent chick-rearing period, however, diving was mainly at dawn and dusk. Of 485 dives measured, the depth averaged 0.74 m, with maximum depth at 6.5 m. On average, grey-headed albatrosses dived 24 times during a 5 day foraging trip. Dive depths increased towards midday, probably as a function of the birds' visual acuity rather than due to vertical migration of their prey. It is estimated that grey-headed albatrosses may obtain 30-45% of their daily food requirements by diving. (Auth.)

#### B-58059

Mataloni, G., Tesolín, G., **Preliminary survey of cryobiontic algal communities from Cierva Point (Antarctic Peninsula)**, *Antarctic science*, Sep. 1997, 9(3), p.250-257, Refs. p.256-257.

Algal communities coloring snow and ice were studied at 14 sites at Cierva Cove. Chlorophyta were the dominant group in cryobiontic communities, both in species richness and abundance. Cyanobacteria and diatoms, in turn, showed a higher species number at low altitude, well drained temporary snow fields, probably denoting a cryoxenic character. Descriptions of the 6 species newly recorded for Antarctica are given, and the taxonomic position of some *Scotiella*, *Trochiscia* and *Koliella* species is discussed. It is suggested that further research is needed to assess the importance of various stress factors in the progressive drop in species richness and biosynthesis of secondary carotenoids associated with a change in snow color from green to orange-red to pink-red. (Auth.)

#### B-58060

Phleger, C.F., Nichols, P.D., Virtue, P., **Lipid, fatty acid and fatty alcohol composition of the myctophid fish *Electrona antarctica*: high level of wax esters and food-chain implications**, *Antarctic science*, Sep. 1997, 9(3), p.258-265, Refs. p.264-265.

The myctophid, *Electrona antarctica*, was collected by trawl from the Elephant I. region and from East Antarctica. Total lipid was higher in Elephant I. *E. antarctica* than those from East Antarctica. Wax esters comprised 86.2-90.5% of total lipid in *E. antarctica* flesh. There were no significant differences between East Antarctica and Elephant I. in total wax ester levels, or in levels of wax esters between different tissues analyzed. Oily bones characterized *E. antarctica* from both locations, with wax esters as the major skeletal lipid class. The wax esters may have a buoyancy role in *E. antarctica*. The only substantial amount of triacylglycerols were found in the viscera of Elephant I. fish. The principal fatty acids of all fish analyzed included the monounsaturated fatty acids 18:1 and 16:1, with lower levels of 16:0 and 14:0 saturated acids. Fatty alcohols were dominated by the saturated 16:0 and 14:0 and the monounsaturated 18:1 and 18:1. The low ratio of 22:1/20:1 alcohols observed for *E. antarctica* is consistent with a diet of amphipods, copepods and other items low in 22:1 alcohols. (Auth. mod.)

#### B-58061

Brey, T., Gerdes, D., **Is Antarctic benthic biomass really higher than elsewhere**, *Antarctic science*, Sep. 1997, 9(3), p.266-267, 26 refs.

The authors analyze benthic biomass data collected from the literature to answer 3 questions: is there any significant difference between antarctic and non-antarctic benthic biomass; how is this difference related to water depth; and is this difference due to particular taxa or feeding guilds. It is found that between the intertidal and 10 m water depth there are no differences in biomass between the Antarctic and the non-Antarctic. From the shallow subtidal down to the upper continental slope (10-1000 m) antarctic macrobenthic biomass is significantly higher.

#### B-58070

Arcangeli, C., Zucconi, L., Onofri, S., Cannistrato, S., **Fluorescence study on whole Antarctic fungal spores under enhanced UV irradiation**, *Journal of photochemistry and photobiology B*, July 1997, 39(3), p.258-264, 22 refs.

The optical fluorescence properties of whole antarctic fungal spores have been investigated in order to evaluate the effects of artificial enhanced UV irradiation. The spores suspension show three main emission bands with maxima around 345, 430, and 510 nm, undergoing to substantial changes after irradiations at  $\lambda > 280$  (UV-B+UV-A+visible) and  $\lambda > 265$  (UV-C+UV-B+UV-A+visible). The optical spectroscopic analysis, conducted also on total spore extracts, indicates the involvement of the electron-proton translocating molecules in the respiratory chain and of the carotenoid pigments in these changes. Moreover, it is suggested that the UV irradiation is responsible for the accumulation of age pigments in the irradiated spores. (Auth.)

#### B-58074

Wöhrmann, A.P.A., **Role of antifreeze glycopeptides in polar fishes' evolution** [Gefrierschutzsubstanzen bei Fischen der Polarmeere und ihre Bedeutung für Evolution und Ökologie],



*Polarforschung*, 1995 (Pub. 1997), 65(1), p.27-40, In German with English summary. Refs. p.37-40.

A novel glycopeptid was isolated and characterized from the fish *Pleuragramma antarcticum*, the "Pleuragramma-antifreeze glycopeptid" (PAGP). The level of antifreeze concentration was dependent on the ambient water temperature, the depth of distribution, the life cycle and the evolution of the species. Surprisingly, detectable antifreeze glycopeptide macromolecules in perciform fish of the Antarctic and gadiform fish of the Arctic and Antarctic could illustrate that, before the continental drift occurred, a precursor glycopeptid existed, and that the existence of freezing resistance in some species reflects the past glaciation. The wide distribution and high heterogeneity of antifreeze peptides point to the assumption that these peptides are results of cold shock stress responses. (Auth. mod.)

#### B-58076

Beyens, L., Chardez, D., **New testate amoebae taxa from the polar regions**, *Acta protozoologica*, 1997, 36(2), p.137-142, 7 refs.

Four new species, and one variety are described: *Schoenbornia smithi* n.sp. is an aquatic taxon living in small pools with an extensive moss vegetation; *Paraquadrula ogdeni* n.sp. and *Netzelia labeosa* n.sp. are terrestrial moss dwelling species; *Centropyxis gasparella* var. *corniculata* var. n. occurs in alkaline waters. These three taxa were observed on Victoria I., Canada. *Microcorycia husvikensis* n.sp. from the subantarctic island South Georgia, sampled in acid to slightly alkaline pools and lakes, vegetated with mosses. (Auth. mod.)

#### B-58077

López de la Cuadra, C.M., García Gómez, J.C., **Studies on recent Macroporidae (Bryozoa: Cheilostomatida), with new taxa and ontogeny of the ovicells**, *Journal of Zoology (London)*, Aug. 1997, 242(4), p.605-621, Refs. p.620-621.

Three new species of the family Macroporidae are described: *Macropora browni* n.sp. and *Macropora uttleyi* n.sp. from New Zealand, the latter differing from other species in the features of female zooids and ovicells and in its uniserial growth; and *Macropora georgiensis* n.sp., the first macroporid found in the Atlantic Ocean, in its southernmost distribution: South Georgia. The geographic range of the family is extended to subantarctic waters of the Atlantic Ocean. A study on the ontogeny of the ovicells of Macroporidae is included and the conclusion is drawn that, in most cases, the ovicell is subimmersed, supported by a kenozooid, and that maternal zooids are differentiated early in ontogeny into female zooids. (Auth. mod.)

#### B-58079

Sojo, F., Valladares, F., Sancho, L.G., **Structural and physiological plasticity of the lichen *Catillaria corymbosa* in different microhabitats of the maritime Antarctica**, *Bryologist*, 1997, 100(2), p.171-179, Refs. p.177-179.

The endemic, maritime antarctic lichen *Catillaria corymbosa* usually occurs on exposed, rocky bird perches. However, some populations of this lichen is found in sheltered, shaded overhangs, little affected by precipitation or run-off, and of a very different microclimate. Thallus anatomy, morphology, and water relations were studied in two populations of *C. corymbosa* together with a third population of intermediate environmental conditions (small, vertical fissures). Specimens from protected microsites possessed a larger percentage of thallus surface area, occupied by soredia and larger chlorophyll contents than those from exposed microsites. They were able to retain water for longer periods of time than those from the exposed microsites, and exhibited the highest net photosynthetic rate on a dry weight basis, and the lowest light compensation point for photosynthesis. Thalli from small fissures exhibited intermediate values for most of the parameters studied. (Auth. mod.)

#### B-58090

Barnes, D.K.A., **Low levels of colonisation in Antarctica: the role of bryozoans in early community development**, International Bryozoology Conference, 10th, Wellington, New Zealand, 1995. Proceedings. Bryozoans in space and time, edited by D.P. Gordon, A.M. Smith and J.A. Grant-Mackie, Wellington,

National Institute of Water & Atmospheric Research, 1996, p.19-28, Refs. p.26-28.

Three arrays of perspex settlement panels were submerged for a period of 21 months at 6, 12, and 25 m depths at Borge Bay. The observed recruitment was very low in terms of space occupied and taxonomic groups present. The patterns of colonization observed on the upper, lower, and side surfaces of the panels were different. Spirorbid polychaetes dominated the space occupied on the shallow panels whilst bryozoans predominated on those at 25 m. The colony sizes of the 2 most abundant bryozoan species suggested bimodal recruitment during the period submerged. Abundance of cheilostomate species on panels was inversely correlated with overgrowth competitive ability such that the poorest competitors were generally most abundant, whilst 3 of the 4 locally abundant, dominant species were not recorded. The bryozoan species composition, together with the absence of representatives from competitively dominant phyla such as sponges and tunicates, exhibited many similarities with traditional ideas on succession. (Auth.)

#### B-58091

Everson, I., Bravington, M., Goss, C., **Combined acoustic and trawl survey for efficiently estimating fish abundance**, *Fisheries research*, 1996, Vol.26, p.75-91, 16 refs.

When fish are patchily distributed, unstratified trawl surveys give highly variable abundance estimates. If the patches are small and mobile, it is impractical to use pre-stratified or multi-stage adaptive designs to reduce variability. Based on recent trawl surveys for mackerel icefish *Champsocephalus gunnari*, the authors have modified the survey design and analysis to reduce estimation variance at minimal cost, using concomitant qualitative acoustic data. They have also developed new confidence interval procedures that should be accurate even for small samples. In computer simulations, the new method substantially outperformed a standard trawl survey. (Auth.)

#### B-58092

Davey, M.C., Ellis-Evans, J.C., **Influence of water content on the light climate within Antarctic mosses characterized using an optical microprobe**, *Journal of bryology*, 1996, Vol.19, p.235-242, 18 refs.

The light climate within wet and dry samples of 10 mosses from Signy I. was determined using a computer-controlled optical microprobe system. Irradiances decreased with increasing depth within the moss. The rate of attenuation varied greatly between replicates reflecting the heterogeneity of the moss macro-structure. Attenuation maxima were observed at wavelengths corresponding to the peaks of chlorophyll absorption around 675 nm and below 450 nm. Wide inter-specific variations in light penetration were observed. The degree to which light penetration changed on dehydration was dependent upon the relative effects of structural and pigment changes. It is suggested that, as drying occurs, the increased penetration of light into the moss increases the photosynthetic potential of deeper layers, and hence reduces the loss of productivity by the moss. (Auth. mod.)

#### B-58094

Best, P.B., **External locations of harpoon wounds on minke whales taken in antarctic commercial whaling operations, 1978/79 season**, *Animal welfare*, 1996, 5(1), p.57-62, 7 refs.

Observations on the external locations of harpoon wounds were made on 127 minke whales *Balaenoptera acutorostrata* taken during Japanese commercial whaling operations in the 1978-79 antarctic season. The numbers of wounds per whale did not vary between catcher boats, the average being 1.2. Although the cranio-thoracic region seemed to be the target of choice (bearing 60.5% of all wounds examined), the proportion of wounds in this region varied significantly between catcher boats, ranging from 43.6 to 75.7%. It is suggested that this variation arose because to hit the cranio-thoracic region, the first section of the whale to surface, requires considerable skill on the part of the gunner.

#### B-58095

Verstraete, F.J.M., Van Aarde, R.J., Nieuwoudt, B.A., Mauer, E., Kass, P.H., **Dental pathology of feral cats on Marion Island, Part I. Congenital, developmental and traumatic abnormalities**, *Journal of comparative pathology*, 1996, 115(3), p.265-282, Refs. p.280-282.



Skulls of adult feral cats from Marion I. were examined macroscopically. Congenital anomalies, which were rare, included a few supernumerary premolars, located mesially to those normally present. Supernumerary roots, mainly of the maxillary third premolar, were found in just over 10% of cases. Fractures were found most commonly in the canine and carnassial teeth, as also were periapical lesions, which were often severe. Mandibular fractures in various stages of healing were found in 11 cats (3.7%); such fractures most frequently affected the body of the mandible and resulted in malunion. It was concluded that the high prevalence of dental fractures and associated periapical lesions probably exerted a significant adverse effect on health and survival in this population of feral cats. (Auth. mod.)

**B-58096**  
Verstraete, F.J.M., Van Aarde, R.J., Nieuwoudt, B.A., Mauer, E., Kass, P.H., **Dental pathology of feral cats on Marion Island, Part II. Periodontitis, external odontoclastic resorption lesions and mandibular thickening**, *Journal of comparative pathology*, 1996, 115(3), p.283-297, Refs. p.296-297.

Skulls of adult feral cats from Marion I. were examined macroscopically. Dental calculus was found infrequently, unlike the hard tissue lesions of moderate and advanced periodontitis and tooth loss (presumably due to periodontitis), which were commonly seen. Abnormal thickening of the mandibula, found in 39.5% of specimens, was most commonly bilateral. The lesions ranged from a focal periosteal reaction, to localized exostosis, to generalized swelling and loss of density, to grossly enlarged mandibles with increased bone density. Mandibular swelling was significantly associated with other abnormalities (periodontitis, dental fractures, external odontoclastic resorption lesions and periapical lesions), but many cases of mandibular swelling were accompanied by only minor dental defects. (Auth. mod.)

**B-58102**  
Chen, X.Z., Xu, Z.Y., Chen, G.Z., **Distribution and standing crops of Antarctic krill in the Prydz Bay region during the austral summer of 1991/1992 and 1992/1993**, *Chinese journal of polar science. Series No.14*, June 1997, 8(1), p.56-64, 16 refs.

Krill population and horizontal and vertical distributions in the Prydz Bay region were investigated in the summers of 1991-92 and 1992-93. Results show that the high density distribution occurs within the area of 63-67°S, 68°E in waters >70 m deep. Krill standing crops were 1.699 x 10<sup>6</sup> t within the surveyed area of 150533.9 km<sup>2</sup> in 1991-92, and 4.043 x 10<sup>6</sup> t within the surveyed area of 125740.7 km<sup>2</sup> in 1992-93. (Auth. mod.)

**B-58107**  
Prince, P.A., Croxall, J.P., **Birds of South Georgia**, *British Ornithologists' Club. Bulletin*, 1996, 116(2), p.81-104, Refs. p.101-104.

On the premise that the current checklist of South Georgia birds is now over 13 years out of date, a new annotated checklist, listing all species currently accepted as having occurred at South Georgia up to Dec. 31, 1994, is presented. Breeding species are classified into 7 categories, according to the size of their breeding population. These are: very rare (<10 pairs); rare (10-99); frequent (100-999); common (1000-9999); very common (10,000-99,999); abundant (100,000-999,999); and very abundant (one million+). The main purpose of this paper, however, is to give details, especially for records since Apr. 1982 of the non-breeding visitors, migrants and vagrants, together with an indication of their status in adjacent areas, especially the Falkland Is. and the Antarctic.

**B-58109**  
Scheltema, R.S., Blake, J.A., Williams, I.P., **Planktonic larvae of spionid and chaetopterid polychaetes from off the west coast of the Antarctic Peninsula**, *Bulletin of marine science*, Mar. 1997, 60(2), p.396-404, 22 refs.

Thirty-five plankton samples were taken during the austral spring, between mid-Oct. and early Nov., in the region west of the Antarctic Peninsula, including the area southwest of Brabant I., northwest of the South Shetland Is., off Elephant I., and in the northwest portion of Bransfield Strait. Somewhat more than half the samples (51%) contain planktonic polychaete larvae, specifically the nectochaetes of the Spionid, *Scolecopsis eltaninae* Blake 1983 or the mesotrocha of the chaetopterid *Phyllocha-*

*etopterus monroi* Hartman 1967. Both species are endemic to antarctic waters, apparently a consequence of the circumpolar current which acts as a barrier to northward larval dispersal. (Auth.)

**B-58110**  
Longton, R.E., **Role of bryophytes and lichens in polar ecosystems**, British Ecological Society. Special publication no.13, Cambridge, Blackwell Science Ltd., 1997, p.69-96, Refs. p.91-96.  
**DLC QH84.1.E26**

This account reviews the role of bryophytes and lichens in arctic and antarctic vegetation, and in energy flow, nutrient cycling and other functional processes in polar ecosystems. Consideration is given to the way in which arctic bryophytes and lichens may be expected to respond to climatic change and other effects of man on the tundra environment. Instructive in this respect is a comparison of Cool-Arctic ecosystems with those on nutrient-rich antarctic islands subject to similar temperatures in summer but to warmer, wetter winters.

**B-58114**  
Delille, D., Marty, G., Cansemi-Soullard, M., Frankignoulle, M., **Influence of subantarctic *Macrocystis* bed metabolism in diel changes of marine bacterioplankton and CO<sub>2</sub> fluxes**, *Journal of plankton research*, Sep. 1997, 19(9), p.1251-1264, 74 refs.

The significance of bacterial communities in the fluxes of carbon and energy in giant kelp beds in Kerguelen Archipelago was estimated by measuring bacterioplankton biomass and production over diel cycles in surface seawaters located inside and outside the beds. Bacterial biomass and production were significantly higher inside the kelp bed than in the surrounding area. Results showed large and clear diel variations of all parameters measured inside the kelp bed. Changes in dissolved oxygen TCO<sub>2</sub> and pCO<sub>2</sub> paralleled those of solar radiation, and were obviously related to the metabolic activity of the kelp. Mean cell volumes and saprophytic bacterial abundance varied over the diel cycles in the same way as photosynthetic activity, while DOC, bacterioplankton production and the frequency of dividing cells varied in an opposite way with maximal values at night-time. (Auth. mod.)

**B-58115**  
Hennion, F., Walton, D.W.H., **Ecology and seed morphology of endemic species from Kerguelen phytogeographic zone**, *Polar biology*, Oct. 1997, 18(4), p.229-235, 25 refs.

Morphological descriptions of the seeds of eight phanerogamic species are provided together with observations on the dispersal of the seeds and the habitats of parent plants. These are discussed in relation to long-distance dispersal and proposals are made for future research. (Auth.)

**B-58116**  
Coria, N.R., Soave, G.E., Montalti, D., **Diet of Cape petrel *Daption capense* during the post-hatching period at Laurie Island, South Orkney Islands, Antarctica**, *Polar biology*, Oct. 1997, 18(4), p.236-239, 18 refs.

The diet of Cape petrel *Daption capense* was investigated at Laurie I., South Orkney Is. in the period of Jan.-Feb. 1996. Stomach contents of adults and regurgitate of chicks were sampled during the post-hatching period. The analysis showed that during the whole sampling period antarctic krill and fish represented the predominant preys in terms of frequency of occurrence, forming nearly 35.8% and 64% by mass, respectively. The species *Electrona antarctica* was the most frequent fish prey. Amphipods were present in lower numbers and cephalopods were detected in the diet, but in a very small proportion. Diet composition in terms of frequency of occurrence, mass and number is compared with results of previous studies. (Auth.)

**B-58117**  
Tsuda, A., Kawaguchi, S., **Microzooplankton grazing in the surface water of the Southern Ocean during an austral summer**, *Polar biology*, Oct. 1997, 18(4), p.240-245, Refs. p.244-245.

Microzooplankton grazing was investigated in surface waters of the Indo-Pacific and Atlantic Ocean by the dilution method. Phytoplankton growth varied mainly between 0.1 and 0.4/d, and microzooplankton grazing between 0.0 and 0.3/d. Great fluctuations in phytoplankton growth



rate were observed at one station within 3 weeks and between closely spaced stations. Microzooplankton grazing rates were similar to phytoplankton growth rate despite the variation of phytoplankton growth rates, although in some cases, phytoplankton growth overwhelmed microzooplankton grazing. These observations suggest that microzooplankton are the main consumers of primary producers, and that steady state between phytoplankton growth and microzooplankton grazing is usually established in the southern ocean in austral summer. (Auth.)

#### B-58118

Regel, J., Pütz, K., **Effect of human disturbance on body temperature and energy expenditure in penguins**, *Polar biology*, Oct. 1997, 18(4), p.246-253, Refs. p.252-253.

A new method to measure and quantify human disturbance in seabirds is presented. The stomach temperatures of moulting emperor penguin chicks and adults (*Aptenodytes forsteri*) were recorded continuously using temperature loggers while the birds were exposed to various man-induced stimuli. Stimuli resulted in typical temperature rises that varied with the duration and strength of the stimulus. On average, the temperature rose by 1.5 K, the maximum reached being 2.6 K following a stimulus of more than 2 h duration. Minimal energy costs inducing the temperature rises could be estimated. Depending on the intensity of disturbance, minimal energy expenditure ranged between 3.2 kJ/kg and 9.7 kJ/kg, being slightly higher in chicks. This represented up to 10% of the daily energy demand during moult. The estimated minimal increase in metabolic rate during stress averaged 2.3 W/kg in chicks and 2.0 W/kg in adults (maxima of 4.2 W/kg and 3.3 W/kg, respectively). (Auth.)

#### B-58119

Jenkin, J.F., **Vegetation of the McDonald Islands, sub-Antarctic**, *Polar biology*, Oct. 1997, 18(4), p.260-272, Refs. p.271-272.

Five species of vascular plant occur on McDonald Is. Only 4 species of moss were found, no hepatics, and 8 species of lichen, together with algal and fungal species. Phanerogamic vegetation, comprising grassland and cushion-carpet herbfield, covers about one-third of the main island. Elsewhere, vegetation is absent or restricted to cryptogamic species. The distribution and occurrence of vegetation are strongly influenced by salt deposition, exposure to wind, substrate stability and biotic influences, particularly the very large assemblages of sea birds. The species-depauperate McDonald Is. are unique and have suffered negligible human impact. A management plan has been prepared, based on the information in this paper. (Auth. mod.)

#### B-58120

Calbet, A., Irigoien, X., **Egg and faecal pellet production rates of the marine copepod *Metridia gerlachei* northwest of the Antarctic Peninsula**, *Polar Biology*, Oct. 1997, 18(4), p.273-279, 26 refs.

Egg and faecal pellet production rates, and their functional response to food and temperature, were measured in the copepod *Metridia gerlachei* during Jan. 1996, covering the Gerlache and Bransfield straits and the Drake Passage. The highest rates of *in situ* egg and faecal pellet production were observed in Gerlache stations, coinciding with chlorophyll *a* concentrations approaching food saturation levels. In the Bransfield and Drake stations, with very low chlorophyll concentrations, the rates of egg production were either very low, or no eggs were produced. Egg production rates appeared to be independent of food concentration on a short time-scale (24-h incubations), while the production of faecal pellets was closely related to food abundance. *M. gerlachei* feeds preferentially on the phytoplankton size-fraction <10 µm. Temperature had no clear effects on egg production rates but had a significant effect on pellet production rates, with maximum values at 2.5°C. (Auth. mod.)

#### B-58121

Vuorinen, I., Hänninen, J., Bonsdorff, E., Boormann, B., Angel, M.V., **Temporal and spacial variation of dominant pelagic Copepoda (Crustacea) in the Weddell Sea (Southern Ocean) 1929-1993**, *Polar biology*, Oct. 1997, 18(4), p.280-291, Refs. p.287-288.

Data on the abundances of 4 dominant copepod species, *Metridia gerlachei*, *Rhincalanus gigas*, *Calanoides acutus* and *Calanus propinquus*, were examined in the Weddell Sea area for the summers of 1929-1939

and 1989-1993. The results are discussed in the light of environmental changes and their hypothesized and observed consequences in the southern ocean: global temperature change, ozone deficiency and cascading trophic interactions. It is concluded that no uniform and consistent abundance changes could be observed in the pelagic Copepoda of the Weddell Sea that could be connected to major environmental changes, expected to affect the whole planktonic ecosystem of the southern ocean. Significant changes in some of the species studied show that the pelagic ecosystem is not in a steady state, but in addition to interannual changes, there also are major fluctuations extending over decades. (Auth. mod.)

#### B-58122

Steele, W.K., Pilgrim, R.L.C., Palma, R.L., **Occurrence of the flea *Glaciopsyllus antarcticus* and avian lice in central Dronning Maud Land**, *Polar biology*, Oct. 1997, 18(4), p.292-294, 11 refs.

The flea *Glaciopsyllus antarcticus* is endemic to the antarctic continent, where it is known to parasitize a number of seabird species. This paper reports the occurrence of the flea and 2 species of lice from snow petrel (*Pagodroma nivea*) colonies in central Queen Maud Land and extends considerably the recorded distribution of the flea. Flea adults, pupae and larvae were recovered from 10 of 11 samples of organic material collected from snow petrel nests at the Svarthamaren Mountain. Specimens of 2 philopterid lice species, *Saemundssonina antarctica* and *Pseudonirmus charcoti*, were recovered from three of these samples. Specimens of the antarctic flea and of the louse *S. antarctica* were recovered from carcasses of snow petrel chicks collected both at Svarthamaren and Roberts Knoll; the louse *P. charcoti* was recovered from Roberts Knoll. (Auth. mod.)

#### B-58124

Petz, W., Foissner, W., **Morphology and infraciliature of some soil ciliates (Protozoa, Ciliophora) from continental Antarctica, with notes on the morphogenesis of *Sterkiella histriomuscorum***, *Polar record*, Oct. 1997, 33(187), p.307-326, Refs. p.324-326.

The morphology of 7 soil ciliate species from Wilkes Land was investigated. Observations on two populations of *Protospathidium serpens* corroborate the view that this species usually has a single, more-or-less nodular, macronucleus distinguishing it from *P. muscicola*, which possesses 10-30 nodules. The antarctic specimens of *P. terricola* differ inconspicuously from the type population in that they are slightly larger, have fewer ciliary rows, and the fragments of the circumoral kinety are less distinctly separated from each other. The antarctic population of *Pseudochilodonopsis mutabilis* possesses a regular dorsal hump and only 12-14 pharyngeal rods. *Oxytricha opisthomuscorum* has 6 dorsal kinetics with long cilia and a buccal cirrus near the anterior end of the paroral membrane. The antarctic specimens of *Sterkiella histriomuscorum* have 5 transverse cirri. (Auth. mod.)

#### B-58133

Ward, B.B., Priscu, J.C., **Detection and characterization of denitrifying bacteria from a permanently ice-covered antarctic lake**, *Hydrobiologia*, Mar. 28, 1997, Vol.347, p.57-68, 27 refs.

Denitrifying bacterial strains were isolated from Lake Bonney, a permanently ice-covered and chemically stratified lake in the McMurdo dry valley region of Antarctica. Three strains, identified as denitrifiers by their ability to produce nitrous oxide using nitrate or nitrite as a respiratory substrate, were characterized as to their temperature and salinity optima for aerobic growth in batch culture; all three were psychrophilic and moderately halophilic. Maximum growth rates were measured for all three strains. Distributions related to the observed chemical distributions imply the occurrence of denitrification in the west lobe of the lake and not in the east lobe. (Auth. mod.)

#### B-58134

Aronson, R.B., Blake, D.B., Oji, T., **Retrograde community structure in the Late Eocene of Antarctica**, *Geology*, Oct. 1997, 25(10), p.903-906, 49 refs.

The La Meseta Formation on Seymour I. represents an ecological anomaly: this deposit contains localized, autochthonous, dense assemblages of ophiuroids and isocrinids in a Late Eocene, shallow-water set-



ting. The rare occurrence of sublethal arm injuries in both the ophiuroid and crinoid populations suggests low predation levels, as seen in similar populations before the Mesozoic. Sporadic return to a Paleozoic community structure was apparently provoked by changes in temperature and productivity in Antarctica during the Late Eocene. (Auth. mod.)

#### B-58141

Di Prisco, G., Giardina, B., **Temperature adaptation: molecular aspects**, Society for Experimental Biology, seminar series 59. **Animals and temperature: phenotypic and evolutionary adaptation**. Edited by I.A. Johnston and A.F. Bennett, Cambridge, UK, Cambridge University Press, 1996, p.23-51, Refs. p.45-51.

#### DLC QP135.A54 1996

Antarctic paleogeography and the adaptive mechanisms of antarctic marine organisms are discussed. Some adaptations, such as freezing avoidance, efficient enzymatic catalysis and cytoskeletal polymer assembly, and decreased blood viscosity through reduction or elimination of erythrocytes and haemoglobin, represent a unique character of antarctic fish and are examined in detail. Specializations in haematology and in the oxygen transport system have also been developed by other polar and temperate organisms, as whales, penguins, krill, and squid. Molecular mechanisms of the oxygen transport system in relation to requirements for function at low temperature are described.

#### B-58142

Somero, G.N., Dahlhoff, E., Lin, J.J., **Stenotherms and eurytherms: mechanisms establishing thermal optima and tolerance ranges**, Society for Experimental Biology, seminar series 59. **Animals and temperature: phenotypic and evolutionary adaptation**. Edited by I.A. Johnston and A.F. Bennett, Cambridge, UK, Cambridge University Press, 1996, p.53-78, 48 refs.

#### DLC QP135.A54 1996

Antarctica is one of the environments considered in this presentation. The review compares homologous biochemical and physiological systems in stenotherms and eurytherms, and relates interspecific differences in these systems to the thermal optima and tolerance ranges characteristic of the whole organism. It also contrasts genetically-fixed traits that are important in setting thermal limits and thermal optima, with more 'plastic' traits that provide significantly different phenotypes under different thermal conditions. Two principal types of biochemical systems are discussed: enzymatic proteins and membranes. In both types of systems, inherent, genetically-based differences in eurythermy at both the physiological and biochemical levels distinguish stenotherms from eurytherms. Potential mechanisms for defining upper lethal temperatures of the various species are suggested.

#### B-58145

Aittaleb, M., Hubner, R., Lamotte-Brasseur, J., Gerday, C., **Cold adaptation parameters derived from cDNA sequencing and molecular modelling of elastase from antarctic fish *Notothenia neglecta***, *Protein engineering*, May 1997, 10(5), p.475-477, 17 refs.

The primary structure of an elastase from the antarctic fish *Notothenia neglecta* (NE) was elucidated by molecular cloning and cDNA sequence analysis. The cDNA of interest was isolated from a cDNA library obtained from *Notothenia's* pyloric caeca. The amino acid sequence identity with mammalian elastases ranges between 53 and 64%, but interestingly reaches 79% with one isoform (CEB) of two recently isolated cod elastases. The most interesting changes distinguishing the model of NE, predicted from the three dimensional structure of the native porcine elastase (PE), concern the catalytic crevice located in the inter-domains region. These features might be involved in the adaptation to cold of the antarctic elastase. (Auth.)

#### B-58146

Rina, M., Caufrier, F., Markaki, M., Mavromatis, K., Kokkinidis, M., Bouriotis, V., **Cloning and characterization of the gene encoding *PspPI* methyltransferase from the antarctic psychrotroph *Psychrobacter* sp. strain TA137. Predicted interactions with DNA and organization of the variable region**, *Gene*, Sep. 15, 1997, 197(1-2), p.353-360, 31 refs.

The gene (*pspPIM*) encoding the *PspPI* DNA methyltransferase (MTase) associated with the *PspPI* restriction-modification (R-M) system (5'-GGNCC-3') of *Psychrobacter species* TA137 has been cloned and expressed in *E. coli*, and its nucleotide (nt) sequence has been determined. The coding region was 1248 nt in length and capable of specifying a 46,826-Da protein of 416 amino acids (aa). The predicted sequence of the MTase protein displays 10 sequence motifs characteristic of all prokaryotic m<sup>5</sup>C-MTases and shows the highest similarity to other MTases that methylate the GGNCC sequence. All 3 MTases methylate the internal cytosine within their recognition sequence. Sequence similarities between M-*PspPI* and its isospecific M-*Eco47II* and M-*Sau96I* as well as with 4 other m<sup>5</sup>C-MTases that methylate the related GGWCC sequence have been also found within the variable region of these proteins. On the basis of structural information from M-*HhaI* and M-*HaeIII*, several M-*PspPI* residues that are expected to interact with DNA can be predicted. Furthermore, an organization of the variable region of m<sup>5</sup>C-MTases into two segments exhibiting a pattern of conserved residues and a considerable degree of structural homologies is described. (Auth. mod.)

#### B-58147

Llarch, À., Logan, N.A., Castellví, J., Prieto, M.J., Guinea, J., **Isolation and characterization of thermophilic *Bacillus* spp. from geothermal environments on Deception Island, South Shetland Archipelago**, *Microbial ecology*, July/Aug. 1997, 34(1), p.58-65, 22 refs.

Ten bacterial strains isolated from water and sediment samples taken from geothermal areas of Deception I. were found to represent six distinct types of thermophilic, Gram-positive, aerobic, catalase positive, endospore-forming rods, identified as *Bacillus* sp. Six representative strains were subjected to routine phenotypic characterization, numerical taxonomic, and chemotaxonomic analyses. Two isolates were identified as thermophilic strains of *B. licheniformis* and *B. megaterium*, but the four other strains could not be identified as known species of *Bacillus* and, hence may represent new ones. (Auth.)

#### B-58148

Croxall, J.P., **Emperor ecology in the antarctic winter**, *Trends in ecology and evolution*, Sep. 1997, 12(9), p.333-334, 15 refs.

This brief essay reviews the uniqueness of Emperor penguins: the reproductive tasks of females; the crèche of the males as they guard the eggs and fast and survive for the 100 days until the eggs hatch and the females return; the extreme diving depths and under water times; the long distances of both adults and chicks on journeys to foraging grounds and the unerring returns to home territory.

#### B-58150

Marshall, D.J., Crafford, J.E., Krynauw, J.R., Drummond, A.E., Newton, I.P., **Biology, physico-chemistry and geology of a nunatak pond at Valterkulen, western Dronning Land, Antarctica**, *South African journal of antarctic research*, 1995, 25(1-2), p.9-16, With Afrikaans summary. Refs. p.16.

Aspects of the biology, physico-chemistry and geology of a remote inland nunatak pond are described. The pond occurs in a rocky depression forming part of the nunatak. Ionic concentrations of the pond water are higher at the center of the pond, and high relative concentrations of Ca and Cl ions are indicative of cryogenic meromixis. The HCO<sub>3</sub> ion concentration (relative to the Cl ion concentration) is particularly high, being similar to the highest value for this ion previously recorded in other antarctic water-bodies. The pond water chemistry reflects that of a deposit coating the stones at the periphery of the pond. A dense, benthic algal mat covers the substratum. It is, however, depauperate in floral and invertebrate species. The benthic invertebrate community comprises only two species of rotifer and one species of tardigrade. These species have superior reproductive capacities compared to some counterparts elsewhere in Antarctica. (Auth. mod.)

#### B-58153

Gremmen, N.J.M., Van der Meijden, R., **Introduced *Agrostis* species at sub-Antarctic Marion Island**, *South African journal of antarctic research*, 1995, 25(1-2), p.85-86, 18 refs.



In 1994, several colonies of a grass of the genus *Agrostis*, clearly different from *A. stolonifera*, were discovered at Transvaal Cove on Marion I. A study of these plants showed the presence of the following 3 introduced *Agrostis* species on Marion I.: *Agrostis castellana* Boiss. & Reuter (Highland Bent); *Agrostis gigantea* Roth (Black Bent); and *Agrostis stolonifera* L. (Creeping Bent). All three introduced species of *Agrostis* flower profusely on the island, but seeds seem to be produced only in favorable years. Often flowers have not yet opened by the onset of winter and flower stalks die off without seed being produced. These additions to the Marion I. flora bring the number of alien vascular plant species collected on the island to 18, out of a total vascular flora of 42 species.

#### B-58181

Hong, X.G., Lu, H., Wu, B.L., **Physiological study of antarctic *Kidderia subquadratum***, *Chinese journal of polar research*, June 1997, 9(2), p.128-133, In Chinese with English summary. Refs. p.132-133.

The ingestion, oxygen consumption and ammonia excretion of *Kidderia subquadratum* have been studied under experimental conditions at the Great Wall Station during the austral summer of 1993-1994. The study of the grazing rate was conducted using chlorophyll-pigment analysis of gut content. With the increasing body size and weight, the rates of grazing and oxygen consumption and ammonia excretion increased per individual; but the rates decreased per unit weight. On the average, the bivalve grazed chlorophyll 19.700 µg/ind/d and consumed oxygen 9.407 µg/ind/d, and produced ammonia 0.489 µg/ind/d. The O/N ratio was between 9.8-16.3, which indicated that protein was the main metabolic substrate used by *K. subquadratum*. (Auth.)

#### B-58186

Klok, C.J., Chown, S.L., **Critical thermal limits, temperature tolerance and water balance of a sub-Antarctic caterpillar, *Pringleophaga marioni* (Lepidoptera: Tineidae)**, *Journal of insect physiology*, July 1997, 43(7), p.685-694, Refs. p.692-694.

Thermal tolerance, supercooling point, water balance and osmoregulatory ability of *Pringleophaga marioni* Viette (Lepidoptera: Tineidae) are investigated. No caterpillars survived for longer than 12 h at -9.0°C. Survival of high temperatures (35°C and above) was poor. Tolerance of water loss (46% of fresh mass) and rates of water loss (1% fresh mass/h) were similar to those found in other mesic insects. *P. marioni* larvae were incapable of metabolizing lipids to replenish lost water and showed no haemolymph osmoregulatory ability. It is suggested that the preponderance of freeze tolerance in high-latitude Southern Hemisphere species may be associated with their occurrence in moist habitats, and that the "freeze tolerance" category be re-examined in the light of the range of strategies adopted by such arthropods. (Auth. mod.)

#### B-58187

Maliutina, M.V., ***Disconectes vanhoeffeni* sp. n., a new species of isopod of the family Munnopsidae from the South Sandwich Trench of the Antarctic**, *Russian journal of marine biology*, May-June 1997, 23(3), p.152-156, Translated from Biologiya moriia. 4 refs.

The morphology and geographic distribution of *Disconectes vanhoeffeni* from the deep-sea South Sandwich Trench are described. It is noted that this is the first record of members of *Disconectes* for the western Antarctic and the second for ultraabyssal depths. (Auth. mod.)

#### B-58189

Kirkwood, R., Robertson, G., **Seasonal change in the foraging ecology of emperor penguins on the Mawson Coast, Antarctica**, *Marine ecology progress series*, Sep. 25, 1997, Vol.156, p.205-223, Refs. p.222-223.

The authors investigated the foraging location, diving behavior, dietary composition, feeding rates and foraging trip durations of emperor penguins *Aptenodytes forsteri* raising chicks at the Auster and Taylor Glacier colonies on the Mawson Coast in the winter, spring and early summer of 1993, to examine seasonal changes in the penguins' foraging ecology. As day-length increased after winter, the penguins' daily swimming time increased from 7.83±1.50 h in Aug. to 12.23±1.25 h in Sep. and 12.95±1.24 h in Oct. Seasonal variations in the penguins' foraging were

probably influenced by fluctuating sea-ice conditions, differences in the prey types available, changes in day-length toward summer, and increasing demands of the growing chicks. (Auth. mod.)

#### B-58190

Bergstrom, D., Selkirk, P., **Distribution of bryophytes on subantarctic Heard Island**, *Bryologist*, Fall 1997, 100(3), p.349-355, 18 refs.

Heard I. is a small, isolated subantarctic island dominated by an ice covered volcano. Glaciers descend the volcano to the sea. Coastal ice free areas of tundra are present separated from each other by glaciers. Each of these areas can be considered as individual islands and Heard I. an archipelago. The distribution of 49 bryophyte taxa across 5 major and 4 minor ice-free areas was examined. Fifty percent of the bryophyte taxa exhibited widespread distribution, occurring on all ice-free islands examined. Absence of some conspicuous species from particular areas appeared to reflect situations where limited habitat variation has restricted the establishment of species. With present global warming, glacial retreat on Heard I. is rapid. Consequently, areas suitable for colonization by plants are increasing and previously separated ice free areas are now merging. (Auth. mod.)

#### B-58212

Tanner, A.C., Herbert, R.A., **Nutrient regeneration in maritime antarctic sediments**, *Kieler Meeresforschungen, Sonderheft*, 1981, No.5, p.390-395, 21 refs.

Primary productivity in antarctic inshore coastal waters at Signy I. is high compared with oceanic production. Seasonal changes in phytoplankton, organic nutrients, total viable bacterial populations, proteolytic bacteria, denitrifying bacteria and heterotrophic nitrogen fixing bacteria have been followed at 14 day intervals from Jan. 1976-Mar. 1978. Phytoplankton productivity reached a maximum in early Jan. and this corresponds with a marked decline in NO<sub>3</sub>-N and PO<sub>4</sub><sup>3-</sup>. After the collapse of the bloom, HN<sub>4</sub><sup>+</sup> levels reached a maximum and correlated with high populations (1.4 x 10<sup>5</sup> bacteria/g dry wt) of proteolytic bacteria in the sediment. A large proportion of the heterotrophs (67%) possesses functional phosphatases which may play a significant role in phosphorus regeneration. (Auth. mod.)

#### B-58213

Murphy, E.J., Trathan, P.N., Everson, I., Parkes, G., Daunt, F., **Krill fishing in the Scotia Sea in relation to bathymetry, including the detailed distribution around South Georgia**, *CCAMLR Science*, 1997, Vol.4, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.1-17, With French, Russian and Spanish summaries. 19 refs.

Analyses of the distribution of krill fishing based on fine-scale data show that harvesting in the Scotia Sea has been mainly in shelf and shelf-break areas on the northern side of the Scotia Arc. Regional analyses reveal that there are restricted parts of shelf and shelf-break areas where high catches have been obtained. Over the 1993-1995 winter fishing seasons individual trawl statistics have been recorded in the South Georgia area. Analyses of these data show marked interannual variability in the distribution of trawls. The data for 1993 show that the fishery was restricted in that period to an area on the western edge of the shelf break, almost totally based over a large shallow bank area on the northeast shelf edge. During 1995 the fishery was still predominantly in this area. The results are discussed in relation to the ecology of krill and the fishery's interaction with local predator colonies. (Auth. mod.)

#### B-58214

Siegel, V., De la Mare, W.K., Loeb, V., **Long-term monitoring of krill recruitment and abundance indices in the Elephant Island area (Antarctic Peninsula)**, *CCAMLR Science*, 1997, Vol.4, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.19-35, With French, Russian and Spanish summaries. Refs. p.31-32.



Krill distribution and density are reviewed for the Elephant I. area with regard to the representativeness of the study area (60°-62°30'S and 53°-57°30'W) for proportional recruit and density indices. Proportional recruitment indices were re-calculated applying the delta distribution approach. The high interannual variability of krill recruitment is confirmed by the present analysis. Results are compared for one- and two-year-old krill. Statistically significant fluctuations in krill density over the period 1977 to 1994 are also confirmed by this study using randomization tests on an analysis of variance. (Auth. mod.)

**B-58215**

Hewitt, R.P., Watters, G., Demer, D.A., **Indices of prey availability near the Seal Island CEMP site: 1990 to 1996**, *CCAMLR Science*, 1997, Vol.4, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.37-45, With French, Russian and Spanish summaries. Refs. p.43-44.

Four indices of prey availability are calculated from surveys conducted in the vicinity of the Seal Is. CEMP site during the austral summers of 1990 to 1996. The indices are measures of average prey density, depth, distance from the Seal Is., and persistence over time. Acoustic data from two AMLR surveys each year were subsampled to include the foraging range of predators breeding at the Seal Is. Indices derived from these data indicate that although average prey density varied by a factor of almost 5 between 1990 and 1996, prey were consistently distributed along the edge of the shelf break north of the islands, and between 25 and 100 m depth. Indices of average prey density agree with demographic indices of krill abundance derived from net samples. Indices of persistence over time reflect the relative biomass of juvenile krill near the Seal Is. (Auth. mod.)

**B-58216**

Kawaguchi, S., Ichii, T., Naganobu, M., **Catch per unit effort and proportional recruitment indices from Japanese krill fishery data in Subarea 48.1**, *CCAMLR Science*, 1997, Vol.4, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.47-63, With French, Russian and Spanish summaries. 13 refs.

Proportional recruitment indices and CPUE in Subarea 48.1 (Antarctic Peninsula region) from 1980 to 1996 were calculated based on logbook data from Japanese commercial krill trawlers. Proportional recruitment rates calculated from fisheries data were similar to those from scientific data and showed a close relationship to sea-ice indices. CPUE (catch/towing volume) in the Livingston I. area showed a decreasing trend during the study period. The use of different fishing strategies in response to a demand for higher product quality and a general decrease in krill density in the study area were considered as possible reasons for this. CPUE in the Elephant I. area showed greater interannual variation without any trend. (Auth.)

**B-58218**

Kerry, K.R., et al, **Foraging range of Adélie penguins—implications for CEMP and interactions with the krill fishery**, *CCAMLR Science*, 1997, Vol.4, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.75-87, With French, Russian and Spanish summaries. 15 refs.

This paper presents a summary of the foraging locations of Adélie penguins, determined by satellite tracking, at 7 widely-spaced breeding colonies along the coast of eastern Antarctica, between 55 and 175°E. Adélie penguins feeding chicks regularly travelled up to 120 km offshore to the continental shelf and returned with krill, *Euphausia superba*. Locations of penguins on foraging trips were compared with historical records of fine-scale krill catch data for the regions of interest. The potential for overlap with krill fishing occurs particularly where ice conditions permit the fishing fleet to approach the edge of the continental shelf or where penguins forage downstream from the fishery. It is suggested that the potential for overlap between foraging areas of Adélie penguins and fishable concentrations of krill be investigated before a decision is made to establish a new CEMP site. (Auth.)

**B-58219**

Cooper, J., Wolfaardt, A.C., Crawford, R.J.M., **Trends in population size and breeding success at colonies of macaroni and rockhopper penguins, Marion Island, 1979/80-1995/96**, *CCAMLR Science*, 1997, Vol.4, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.89-103, With French, Russian and Spanish summaries. 6 refs.

At Marion I., annual breeding success of macaroni (*Eudyptes chrysolophus*) between 1979-80 and 1995-96 and rockhopper penguins (*E. chrysocome*) between 1985-86 and 1995-96 was measured. For macaroni penguins, averages of 0.48 eggs and 0.35 chicks were hatched and fledged respectively for each clutch laid. Corresponding averages for rockhopper penguins were 0.68 eggs and 0.48, respectively. The largest of the 3 macaroni penguin colonies investigated decreased in size over the study period, while the other 2 remained stable. The only significant relationship between inter-season trends in the number of pairs breeding at the 3 colonies was a negative correlation between 2 adjacent colonies, which suggests inter-colony transfer. The larger 2 of the 3 rockhopper penguin colonies investigated decreased over the study period, while the other remained stable. Trends in the number of pairs breeding at the 3 rockhopper penguin colonies were all significantly correlated. It is suggested that factors influencing the reproductive performance of the 2 species are not the same. (Auth. mod.)

**B-58220**

García de la Rosa, S.B., Sánchez, F., Figueroa, D., **Comparative feeding ecology of Patagonian toothfish (*Dissostichus eleginoides*) in the southwestern Atlantic**, *CCAMLR Science*, 1997, Vol.4, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.105-124, With French, Russian and Spanish summaries. Refs. p.120-122.

The diet of (*Dissostichus eleginoides*) was investigated around South Georgia. The area was divided into two zones: the shelf zone and deep-water zone. The size distribution included both juvenile and adult stages, and ranged between 18 and 212 cm TL (total length). The diets of fish of various sizes and both sexes were compared, and the feeding status of this species is discussed. *D. eleginoides* is a mixed-species carnivore, feeding principally on fish and secondarily on crustaceans and cephalopods. Adult *D. eleginoides* preyed mainly on fish and on Decapoda, while juveniles in coastal waters consumed krill and, in deeper waters, various species of fish. It was also found that the diet of *D. eleginoides* varied in relation to its size and water depth in both the shallow and deep-water zones. (Auth. mod.)

**B-58221**

Rodhouse, P.G., **Precautionary measures for a new fishery on *Martialia hyadesi* (Cephalopoda, Ommastrephidae) in the Scotia Sea: an ecological approach**, *CCAMLR Science*, 1997, Vol.4, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.125-139, With French, Russian and Spanish summaries. Refs. p.135-136.

In anticipation of the development of a new fishery for the ommastrephid squid *Martialia hyadesi* in the Scotia Sea, this paper presents a revision of annual consumption of the species by higher predators and provides a brief review of information about the life cycle and distribution of the species obtained from research fishing and commercial catches. This species is eaten by seals, whales and seabirds. A conservative estimate for total annual consumption of *M. hyadesi* by higher predators in the Scotia Sea is 245,000 tonnes, with an upper estimate of 550,000 tonnes. *M. hyadesi* spawns between autumn and mid-summer with peak hatching in winter/spring. It is proposed that the timing and catches of the fishery should be highly conservative and set taking into account the timing of breeding and consumption rates of the most sensitive of the dependent species. Most antarctic predators which have been studied consume relatively small and immature specimens of *M. hyadesi*. (Auth. mod.)

**B-58222**

Watters, G., **Preliminary analyses of data collected during**



**experimental phases of the 1994/95 and 1995/96 antarctic crab fishing seasons, CCAMLR Science, 1997, Vol.4, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.141-159, With French, Russian and Spanish summaries. 9 refs.**

Data collected on board the FV *American Champion* during Phases 1 and 2 of the experimental crab fishery were analyzed using generalized additive models and depletion estimators. Results from the generalized additive models show that the density of fishable *Paralomis spinosissima* is highest off the northern coast of South Georgia and at depths of about 100 to 300 fathoms. The Phase 1 results suggest that it would not be appropriate to extrapolate local estimates of abundance to the whole of Subarea 48.3 solely on the basis of depth-specific seabed area; extrapolations must consider location. Linear models fitted to catch per unit effort (CPUE) and cumulative catch data from the Phase 2 depletion experiments did not have significant negative slopes. The insignificant regressions were probably a result of small catches, inter-haul variability in CPUE, and crab movement, and suggested that depletion estimators will not be appropriate tools for estimating local abundances of *P. spinosissima*. (Auth. mod.)

#### B-58223

Kasatkina, S.M., **Selectivity of commercial and research trawls in relation to krill, CCAMLR Science, 1997, Vol.4, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.161-169, With French, Russian and Spanish summaries. 6 refs.**

This paper describes the results of fishing a single krill aggregation with a commercial trawl RT 72/308 and an Isaacs-Kidd midwater research trawl (IKMT). The commercial trawl catches contained more large krill (35-58 mm) than catches of the research trawl (30-54 mm). Statistically significant variability in krill length composition was observed between catches made by the research trawl, while in commercial trawl catches krill length composition hardly varied at all. The various selectivity properties of the trawl used in acoustic surveys have different effects on the accuracy of krill abundance and biomass estimates. Estimates of krill mass density ( $\text{g/m}^2$ ) and biomass are less dependent upon the selectivity properties of trawls used in acoustic surveys than are estimates of krill numerical density (numbers/ $\text{m}^2$ ) and abundance. (Auth. mod.)

#### B-58224

Capdeville, D., **Interaction of marine mammals with the longline fishery around the Kerguelen Islands (Division 58.5.1) during the 1995/96 cruise, CCAMLR Science, 1997, Vol.4, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.171-174, With French, Russian and Spanish summaries. 6 refs.**

The only interaction observed between longliners fishing for Patagonian toothfish (*Dissostichus eleginoides*) to the west of the Kerguelen Is. during the 1995-96 cruise, and marine mammals, occurred with the antarctic fur seal (*Arctocephalus gazella*). These seals are responsible for the loss of 0.75% of toothfish during the longline sets in which interaction occurred, as against 2.2% of fish lost from the hooks during line hauling. (Auth.)

#### B-58225

Duhamel, G., Pruvost, P., Capdeville, D., **By-catch of fish in longline catches off the Kerguelen Islands (Division 58.5.1) during the 1995/96 season, CCAMLR Science, 1997, Vol.4, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.175-193, With French, Russian and Spanish summaries. 12 refs.**

By-catches of fish taken during a commercial fishing cruise and an experimental deep-sea longline fishing cruise targeting Patagonian toothfish (*Dissostichus eleginoides*) off the Kerguelen Is. (Division 58.5.1) during the 1995-96 season were analyzed. Eleven species were identified, of which the grenadier *Macrourus carinatus*, the skates *Bathyraja eatonii* and *B. irrada* and the morid *Antimora rostrata* were dominant. The others were mainly shelf-dwelling species found at the limit of their bathymetric range. An abundance index was used to show bathymetric and geographi-

cal distributions of the most common by-catch species. The size of some by-catch species shows that they could be of interest commercially if longline fishing operations expand in this part of the southern ocean in the future. (Auth.)

#### B-58226

Kasatkina, S.M., Shnar, V.N., Polishchuk, M.I., Abramov, A.M., Sushin, V.A., **Assessment of krill flux factors in waters of the South Orkney Islands during summer 1996, CCAMLR Science, 1997, Vol.4, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.195-204, With French, Russian and Spanish summaries. 13 refs.**

This paper describes the results of an experiment conducted from Feb. 19 to Mar. 7, 1996 to assess krill flux factors in the zone of interaction between waters of the Antarctic Circumpolar Current (ACC) and the Weddell Sea. The study area covered sites where high krill concentrations had often been observed in the past. The geostrophic transport of krill across boundaries of the study area was calculated as a product of two variables integrated over the depth range 0 to 200 m: krill density ( $\text{g/m}^3$ ) and water mass transport ( $\text{M}^3/\text{sec}$ ) per nautical mile of the study area boundary. Also given are the results of krill density assessment, evaluations of geostrophic and wind-induced water transport along the study area perimeter. Mean krill transport rate was 7.2 tonnes/hour/n mile with a standard deviation of 15.5 tonnes/hour/n mile. (Auth. mod.)

#### B-58228

Karentz, D., Dunlap, W.C., Bosch, I., **Temporal and spatial occurrence of UV-absorbing mycosporine-like amino acids in tissues of the antarctic sea urchin *Sterechnus neumayeri* during springtime ozone-depletion, Marine biology, Aug. 1997, 129(2), p.343-353, Refs. p.352-353.**

From Sep. to Nov. 1991, UV-absorbing mycosporine-like amino acids (MAAs) were monitored in a natural population of the sea urchin *Sterechnus neumayeri* from a coastal area of Anvers I. MAA concentrations were determined for specific tissues (gonad, digestive tract and body wall) from adults collected at 4 depths (intertidal, 8, 15 and 24 m). Four MAAs were identified: mycosporine-glycine, shinorine, porphyra-334 and palythine. Concentrations of MAA content in ovaries decreased with depth on all sample dates; however, the MAA content of the digestive tract and body wall did not exhibit a consistent pattern of change with depth. Large daily and seasonal fluctuations in the light regime, which are characteristic of antarctic coastal environments, apparently do not provide reliable cues to elicit a detectable, temporal, biochemical response. (Auth. mod.)

#### B-58237

Peck, L.S., Brockington, S., Brey, T., **Growth and metabolism in the antarctic brachiopod *Liothyrella uva*, Royal Society of London. Philosophical transactions. Series B, July 29, 1997, 352(1355), p.851-858, 42 refs.**

Summer and winter growth rates were assessed separately for a population of the antarctic brachiopod *Liothyrella uva* between early Jan. 1992 and Dec. 1993. Annual shell growth rates were 2-6 times slower than those reported for temperate species. Growth in specimens less than 20 mm in length was faster in 1992 than in 1993. Growth was much faster in winter periods than during the summers. This runs contrary to current ideas on the effects of seasonality on the biology of polar marine invertebrates, but may be an effect of maximizing the efficiency of resource utilization. Comparisons with previous work showed shell growth to be decoupled from periods of tissue mass increase, and also from the main period of phytoplankton productivity. Oxygen consumption of 75 of the specimens used in the growth study was measured to test the hypothesis that basal metabolic rates should be inversely correlated with growth rates. An analysis of residuals produced no significant relationship, positive or negative, between growth rate and basal metabolism. (Auth. mod.)

#### B-58239

McCann, T.S., **Aggressive and maternal activities of female southern elephant seals (*Mirounga Leonina*), Animal behavior, 1982, Vol.30, p.268-276, 20 refs.**



Forty-four individually marked female southern elephant seals, *Mirounga leonina*, were studied at South Georgia. Evidence of dominance and subordination could be determined in only 29% of 1315 encounters, but dominance-subordination relationships were observed in 49% of known cow dyads. Status was not necessarily size- or age-related, but most young, small cows were of low status. High-status cows reared larger pups which were bitten less frequently than pups of low-status cows. Orphaned pups were bitten at least three times as frequently as pups with mothers. Cows with pups initiated more interactions than pregnant cows, and were dominant more frequently. Older cows responded to their newborn pup more rapidly and intensively than did younger cows and this difference can be important in crowded breeding assemblies. Cow and pup behavior in *M. leonina* at South Georgia is compared with that of *M. angustirostris* in California. The main differences are thought to relate to differences in population density. (Auth.)

#### B-58252

Grey, J., Laybourn-Parry, J., Leakey, R.J.G., McMinn, A., **Temporal patterns of protozooplankton abundance and their food in Ellis Fjord, Princess Elizabeth Land, eastern Antarctica**, *Estuarine, coastal and shelf science*, July 1997, 45(1), p.17-25, 63 refs.

The abundance and biomass of ciliates, dinoflagellates and heterotrophic and phototrophic nanoflagellates were determined at three sites along an ice-covered antarctic fjord between Jan. and Nov. 1993. In general, the protozooplankton exhibited a seasonal variation which closely mirrored that of chlorophyll *a* and bacterioplankton. The fjord mouth consistently had the highest densities of ciliates and the most diverse community. To the authors' knowledge, this is the first seasonal study of an antarctic fjord. The Ellis Fjord is very unproductive compared to lower latitude systems, and supports low biomass of phytoplankton and microbial plankton during most of the year. This relates to severe climatic and seasonal conditions, and the lack of allochthonous carbon inputs to the system. Thus, high latitude estuaries may differ significantly from lower latitude systems, which generally rank among the most productive aquatic systems in the world. (Auth. mod.)

#### B-58253

Davey, M.C., **Effect of short-term dehydration and rehydration on photosynthesis and respiration by antarctic bryophytes**, *Environmental and experimental botany*, June 1997, 37(2-3), p.187-198, 31 refs.

The hypothesis that rates of carbon exchange and recovery following dehydration by antarctic bryophytes are related to habitat water availability was investigated. Carbon fixation was measured using an infra-red gas analysis system. As the water content of the bryophytes was reduced, respiration rates fell less quickly than those for gross photosynthesis. Comparison of the experimental observations with measurements of field water contents suggested that water contents of hydric and mesic species remained above those required to maintain maximal rates of photosynthesis through most of the growing season, whereas photosynthesis by xeric species was often water-limited. The results provide a basis for the inclusion of water content and desiccation events in models of antarctic bryophyte productivity. (Auth. mod.)

#### B-58255

Goss, C., Bone, D.G., Peck, J.M., Everson, I., Hunt, G.L., Jr., Murray, A.W.A., **Small-scale interactions between prions *Pachyptila* spp. and their zooplankton prey at an inshore site near Bird Island, South Georgia**, *Marine ecology progress series*, July 31, 1997, Vol.154, p.41-51, 41 refs.

The authors investigated the relationship between surface-foraging prions *Pachyptila* spp. and their zooplankton prey by comparing counts of foraging birds with near-surface concentrations of zooplankton from net samples. Zooplankton abundance was assessed by employing a new design of sampler that combined a frame net with a pump at the cod-end and which was deployed at the sea surface. Six transects using the sampler with concurrent bird observations were made over a short stretch of Steward Strait near Bird I. Concentrations of a variety of zooplankton species occurred patchily along each transect. Peak numbers of prions were recorded consistently towards the southern end of each transect. These peaks coincided with peaks in zooplankton numbers, but with different prey species predominant on different occasions. Comparison of the dis-

tribution of foraging and sitting birds with the presence or absence of zooplankton peaks, after pooling zooplankton species into 2 broad classes, showed that birds were consistently observed over copepod maxima, but were not associated with aggregations of larger zooplankton more often than expected by chance. (Auth.)

#### B-58256

McClintock, J.B., Baker, B.J., **Palatability and chemical defense of eggs, embryos and larvae of shallow-water antarctic marine invertebrates**, *Marine ecology progress series*, July 31, 1997, Vol.154, p.121-131, 70 refs.

The present study examines aspects of palatability and chemical defense in the early life history stages of 7 common species of shallow-water antarctic marine invertebrates with contrasting modes of reproduction. These included the spawned eggs and larvae of a sea urchin and the intraovarian eggs of a sea star, both with planktotrophic larvae, and the lecithotrophic embryos and larvae of 3 sea stars with either brooding or broadcasting modes of reproduction. In addition, a sponge and a nudibranch with brooded lecithotrophic embryos and egg ribbons, respectively, were investigated. The findings indicate predators display species-specific feeding deterrent responses and support observations that lecithotrophic embryos or larvae may be particularly well suited to chemical defenses. Chemical defense in early life history stages may be especially important in shallow antarctic seas where species with lecithotrophic development patterns are relatively common, and where conspicuous yolky embryos or larvae may spend a considerable period of time developing in benthic or pelagic environments prior to recruitment. (Auth. mod.)

#### B-58259

Spiridonov, V.A., Kosobokova, K.N., **Winter ontogenetic migrations and the onset of gonad development in large dominant calanoid copepods in the Weddell Gyre (Antarctica)**, *Marine geology progress series*, Oct. 16, 1997, Vol.157, p.233-246, 57 refs.

Data are presented on abundance, stage composition and vertical distribution, sex ratio, maturity states, and the inferred seasonal/ontogenetic migrations of *Calanoides acutus*, *Calanus propinquus*, and *Rhincalanus gigas* obtained during the Winter Weddell Gyre Study 1992 in early to mid-winter. The descent of CV and CVI was close to completion by June while CIV continued to sink slowly during the winter. By mid-winter, sexual differentiation in CV, maturation of males, and the onset of female maturation were observed for *C. acutus*. Males of *C. acutus* maintained restricted vertical distribution centered in the core of the Warm Deep Water. *C. propinquus* showed no indication of regular ontogenetic migration, but did show some seasonal changes in the vertical distribution of particular stages with a strong geographical variability. *R. gigas* underwent a downward migration, which was only detected in the Weddell Front and in the Maud Rise area. Although sexual differentiation in CV was in progress in winter, the onset of maturation of both males and females in *R. gigas* appeared to be delayed until at least the end of winter. (Auth. mod.)

#### B-58260

Ward, P., Atkinson, A., Schnack-Schiel, S.B., Murray, A.W.A., **Regional variation in the life cycle of *Rhincalanus gigas* (Copepoda: Calanoida) in the Atlantic Sector of the southern ocean—re-examination of existing data (1928-1993)**, *Marine ecology progress series*, Oct. 16, 1997, Vol.157, p.261-275, 48 refs.

A regional comparison of the life cycle of *Rhincalanus gigas* was undertaken on the basis of selected net haul data collected in the South Atlantic Ocean in 1928-1993. Data were pooled into 3 regions, a northern region (NR) extending from the Scotia Sea to the Subantarctic Front and incorporating the Polar Front and Polar Frontal Zone, the Weddell-Scotia Confluence (WSC) and the Eastern Weddell Sea (EWS). There are distinct regional contrasts in the physical environment, the NR being largely ice-free throughout the year compared to the 9 mo. ice cover found in the EWS. *R. gigas* was most abundant in the NR, particularly at the Polar Front and seasonal fluctuations in abundance in all regions were low. In the WSC no clear seasonal pattern could be resolved. A winter decline in the abundance of CIV to CVI in the NR and their clear recruitment from



Oct. onwards suggests that a proportion of the population has a 1 yr life cycle. In contrast, in the EWS a strong overwintering presence of CIV to CVI suggests that a 2 yr cycle is more likely. (Auth. mod.)

### B-58263

Sunda, W.G., Huntsman, S.A., **Interrelated influence of iron, light and cell size on marine phytoplankton growth**, *Nature*, Nov. 27, 1997, 390(6658), p.389-392, 26 refs.

Phytoplankton growth can be simultaneously limited by the availability of both iron and light. Such a co-limitation may be experienced by phytoplankton in iron-poor regions in which the surface mixed layer extends below the euphotic zone—as often occurs in the southern ocean—or near the bottom of the euphotic zone in more stratified waters. By favoring the growth of smaller cells, iron/light co-limitation should increase grazing by microzooplankton, and thus minimize the loss of fixed carbon and nitrogen from surface waters in settling particles. (Auth. mod.)

### B-58270

Ross, R.M., ed, Hofmann, E.E., ed, Quetin, L.B., ed, **Foundations for ecological research west of the Antarctic Peninsula**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, 448p., Refs. passim. For individual papers see A-58271, A-58290 through A-58292, B-58272, B-58276, B-58278 through B-58289, B-58293, E-58277, F-58274, I-58275 and J-58273.

**DLC QH541.264.A6F67 1996**

The Long-Term Ecological Research (LTER) Program was established in 1981 by the U.S. National Science Foundation in recognition of the need to study ecological processes over time spans longer than those of most research grants. The intent of this volume is to bring together meteorological, hydrographical, biological and ecological observations made in the general area west of the Antarctic Peninsula and to discuss the processes underlying the observations. This compilation of available data and observations in conjunction with the present understanding of processes provides the foundation for long-term studies of the ecosystem in the western Antarctic Peninsula region. The primarily marine focus of this volume reflects differences in habitat area and species richness between the marine and terrestrial ecosystems in Antarctica.

### B-58272

Smith, R.I.L., **Terrestrial and freshwater biotic components of the western Antarctic Peninsula**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.15-59, Refs. p.53-59.

**DLC QH541.264.A6F67 1996**

A review is presented of the biota and functional processes of the terrestrial and freshwater ecosystems of the western Antarctic Peninsula. A historical overview of investigations and research is given. The major geographical and climatic divisions of the region are defined, and the biological significance of the driving environmental variables is described. The diversity of life forms, principal ecological processes and vegetation dynamics are discussed; a subjective classification of the plant communities is proposed. Physiological and other biological processes, although among the least studied features of the biota, are discussed, with particular regard to survival mechanisms. The weaknesses of research to date are taken as the basis for recommendations for future research directions, highlighting the major advantages for testing ecological and physiological hypotheses in the simple ecosystems of this sector of the Antarctic. (Auth. mod.)

### B-58276

Clarke, A., **Benthic marine habitats in Antarctica**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.123-133, Refs. p.131-133.

**DLC QH541.264.A6F67 1996**

Benthic habitats in Antarctica differ from those in other parts of the world in several important characteristics. Most of the southern ocean overlies the abyssal plain, where the sediments are primarily siliceous. Ice-rafted debris provides isolated patches of hard substratum but other-

wise little is known of the biology of the deep-sea in Antarctica. Shallow water habitats are heavily influenced by ice, with typical intertidal habitats being almost devoid of life. Continental shelves are usually deep around Antarctica and the sediments are predominantly glacial-marine. Antarctica lacks typical fluvial habitats such as rivers, estuaries and has very few intertidal mudflats, and away from the immediate sublittoral the habitats suffer less physical and biological disturbance than the continental shelves of the Arctic. (Auth.)

### B-58278

Garrison, D.L., Mathot, S., **Pelagic and sea ice microbial communities**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.155-172, Refs. p.168-172.

**DLC QH541.264.A6F67 1996**

This chapter focuses on the composition of the base of the antarctic food web and, in particular, the abundance and distribution of heterotrophic flagellates and ciliates. In polar waters, microbial assemblages inhabit sea ice and the water column; both of these communities are considered in this chapter. Data are scarce from the western Antarctic Peninsula region, so information from the Scotia and Weddell Seas has been incorporated to provide a fuller description of microbial communities. Organisms occupy a variety of microhabitats in the sea ice. Similar to the water column, ice assemblages are comprised of a diversity and abundance of both autotrophs and heterotrophs. Many of the same species occur in both ice and water, supporting the hypothesis that ice-associated forms provide a seed population for water column populations. (Auth. mod.)

### B-58279

Bidigare, R.R., Iriarte, J.L., Kang, S.H., Karentz, D., Ondrusek, M.E., Fryxell, G.A., **Phytoplankton: quantitative and qualitative assessments**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.173-198, Refs. p.196-198.

**DLC QH541.264.A6F67 1996**

The standing stock of phytoplankton and its physiological condition can be estimated using several methods or combinations of methods. In this chapter, the stress is on comparisons of those methods in detecting recently observed phytoplankton patterns west of the Antarctic Peninsula: size fractionation, cell counts, chlorophyll *a* and other pigments, and photoprotective mycosporine-like amino acids. The biomass of phytoplankton within the study area was variable, with the highest contribution by net phytoplankton found in coastal waters of the South Shetland Is., and the highest contribution of nanophytoplankton found in Drake Passage waters. HPLC pigment analyses were carried out on suspended particle samples collected along four north-south transects in the Bellingshausen Sea. Elevated chl *a* levels were measured at the edge of the marginal ice zone (MIZ). Accessory pigment distributions documented that the phytoplankton sampled at the ice edge during the first 3 transects was dominated by *Phaeocystis* spp. in colonial form. Pigment patterns observed at the edge of the MIZ on the fourth transect revealed that the *Phaeocystis*-dominated phytoplankton community was replaced by a diatom-dominated phytoplankton community. (Auth. mod.)

### B-58280

Ross, R.M., Quetin, L.B., Lascara, C.M., **Distribution of antarctic krill and dominant zooplankton west of the Antarctic Peninsula**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.199-217, Refs. p.215-217.

**DLC QH541.264.A6F67 1996**

The horizontal and vertical distributions of selected taxa that dominate the pelagic zooplankton community within the Palmer Long-Term Ecological Research (LTER) study region are described. In addition to a synthesis of existing published descriptions for euphausiids, salps, and copepods, two newly available datasets are analyzed. Recent observations (1991-1994) obtained as part of the Palmer LTER program are used to provide new information on the seasonal and interannual distribution and abundance of the salp, *Salpa thompsonii*. Acoustic data collected during a



series of 12 cruises conducted in the late 1980s are used to describe seasonal differences in the geographic distribution and the dimensional character of krill (*Euphausia superba*) aggregations along the west coast of the Antarctic Peninsula. (Auth.)

**B-58281**

Clarke, A., **Distribution of antarctic marine benthic communities**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.219-230, Refs. p.228-230.

**DLC QH541.264.A6F67 1996**

The Polar Frontal Zone, although predominantly a surface feature, forms a natural northernmost boundary for defining the southern ocean, and relatively few benthic organisms have distributions which cross this boundary. Many antarctic benthic plants and animals have circumpolar distributions but some broad geographical subdivisions may be made. Detailed studies of community distribution are few in Antarctica, but heterogeneity has been demonstrated on all spatial scales. The southern ocean has a rich fauna compared with the much younger Arctic basin, and there is no convincing evidence either for or against a universal latitudinal cline in diversity in the Southern Hemisphere to match that well described from the Northern Hemisphere. Shallow water distributions are strongly affected by ice-related processes, and this leads to a strong vertical zonation in the biological assemblages of sublittoral habitats. (Auth.)

**B-58282**

Kellermann, A.K., **Midwater fish ecology**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.231-256, Refs. p.252-256.

**DLC QH541.264.A6F67 1996**

Spatial and temporal distribution and life-history patterns of the meso- and bathypelagic fishes and of the secondarily pelagic coastal fishes are discussed on the background of life-histories and physical boundary conditions. The LTER study area belongs to the Seasonal Pack-Ice Zone and is a transitional area between the High-Antarctic and the Ice-Free Zone of the southern Scotia Arch. The midwater fish assemblage is structured by ice coverage, water mass advection, circulation, water depth and ontogenetic shifts of life modes. Several midwater fish species spawn in the LTER study area. It is also the northern periphery of a spawning stock of *Pleuragramma antarcticum* assumed to exist in the Bellingshausen Sea. The Circumantarctic Current from the South East Pacific Basin and the Bellingshausen Sea imports High-Antarctic fish species as well as meso- and bathypelagic fishes onto the shelves. Export of early life-stages from the region occurs into the adjacent Bransfield and Gerlache Straits. (Auth. mod.)

**B-58283**

Fraser, W.R., Trivelpiece, W.Z., **Factors controlling the distribution of seabirds: winter-summer heterogeneity in the distribution of Adélie Penguin populations**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.257-272, Refs. p.270-272.

**DLC QH541.264.A6F67 1996**

Recent and historical data on the distribution of Adélie penguins in the western Antarctic Peninsula region were analyzed to examine and detect patterns and causes of heterogeneity, and to relate these to long-term population changes. Adélie penguins are one of the dominant components of the region's seabird community in terms of biomass, but not in numerical abundance. Approximately 308,300 pairs breed in the region, 80% of which are found in five colony clusters. These colony clusters are associated with deep canyons and basins that intersect the continental shelf. Adélie penguins confine foraging activities to regions over these deep features that are within 20-50 km from colony clusters. Winter distributions in the Weddell and Bellingshausen Seas exhibit similar spatial heterogeneity and also occur in association with anomalies in bottom topography.

Available daylight in winter restricts available foraging time, an analog to summer conditions when similar restrictions occur due to the need to provision chicks. (Auth. mod.)

**B-58284**

Trivelpiece, W.Z., Fraser, W.R., **Breeding biology and distribution of Adélie Penguins: adaptations to environmental variability**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.273-285, Refs. p.284-285.

**DLC QH541.264.A6F67 1996**

The major physical factors affecting the breeding success, distribution and demography of Adélie penguins in the southern ocean are variability in sea ice cover, ocean circulation patterns and terrestrial topography. The authors analyzed Adélie distributions in the Antarctic Peninsula region and concluded that Adélie penguins have discrete subpopulations in the northeastern and southwestern regions of the area. These subpopulations are separated by a 400 km gap in their respective distributions, but each is within several hundred kilometers of predictable pack ice areas in the Weddell and Bellingshausen Seas, respectively. It is proposed that these pack ice areas are the wintering grounds for each subpopulation, and that access to these pack ice areas, early in the season following courtship fasting, is the key to successful breeding in Adélies. (Auth. mod.)

**B-58285**

Costa, D.P., Crocker, D.E., **Marine mammals of the southern ocean**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.287-301, Refs. p.298-301.

**DLC QH541.264.A6F67 1996**

Six species of pinnipeds inhabit the southern ocean, including 5 species of true seals (family Phocidae) and one species of eared seal (family Otariidae). It is a critical feeding ground for many cetaceans: 15 species of cetaceans, including 6 species of baleen whales, Mysticeti, and 8 species of toothed whales, Odontoceti, inhabit the southern ocean. Climate, substrate and prey availability are the key factors controlling breeding distributions. A unique reproductive pattern has evolved in the true seals, Phocidae, that enables them to inhabit and breed in the extensive ice regions of the southern ocean. While exerting strong direct influences on distribution, changes in the physical properties of the environment, most likely have strong indirect effects on both the quality and quantity of breeding substrate, the nature of foraging habitat, or on distribution and abundance of potential prey. The occurrence and extent of seasonal ice also plays a role in determining the distribution and abundance of marine mammals. This chapter provides an overview of the biology of marine mammals found in the southern ocean. (Auth. mod.)

**B-58286**

Karl, D.M., Christian, J.R., Dore, J.E., Letelier, R.M., **Microbiological oceanography in the region west of the Antarctic Peninsula: microbial dynamics, nitrogen cycle and carbon flux**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.303-332, Refs. p.326-332.

**DLC QH541.264.A6F67 1996**

Compared to other coastal and oceanic habitats microbial processes in antarctic marine habitats are poorly understood. One major reason is the spatially and temporally variable nature of the habitat and the general inaccessibility of selected habitats. Despite these limitations, the region west of the Antarctic Peninsula is beginning to provide an opportunity for year-round field investigations. Progress to date has focused on the role of microorganisms in the biogeochemical cycling of carbon and associated elements, the regulation of bacterial populations and the relationships between primary production and particulate matter export from the euphotic zone. The emergent patterns of carbon and energy flow and of microbial population inter-actions comprise a prospectus and a challenge for future studies in this region. (Auth. mod.)



**B-58287**

Smith, R.C., Dierssen, H.M., Vernet, M., **Phytoplankton biomass and productivity in the western Antarctic Peninsula region**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.333-356, Refs. p.353-356.

**DLC QH541.264.A6F67 1996**

The authors present an overview of the temporal and spatial variability in phytoplankton biomass and primary productivity for the Palmer Long-Term Ecological Research area west of the Antarctic Peninsula, based on ship and satellite data collected in this region, and summarize factors controlling primary productivity. If historical data are representative, considering the complex space/time variability of the area, then the average primary productivity of this region is of the order of a few hundred  $gC/m^2/y$  which, while about a factor of 5 lower, is roughly comparable to other productive coastal areas of the world's oceans. (Auth. mod.)

**B-58288**

Quetin, L.B., Ross, R.M., Frazer, T.K., Haberman, K.L., **Factors affecting distribution and abundance of zooplankton, with an emphasis on antarctic krill, *Euphausia superba***, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.357-371, Refs. p.368-371.

**DLC QH541.264.A6F67 1996**

Variation in the abundance and distribution of zooplankton is an inherent characteristic of pelagic marine ecosystems. In this chapter, the authors discuss how patterns of abundance and distribution are affected by the life cycle characteristics of some of the predominant macrozooplankton west of the Antarctic Peninsula. Because of the importance of antarctic krill, *Euphausia superba*, within this region, some aspects of its ecology are given special attention. Of particular relevance to current hypotheses is the association of krill and sea ice, and new evidence is presented for winter habitat segregation between adult and larval stages. Subsequent discussion focuses on strategies for winter survival, and variation in recruitment. Also discussed are the effects of abiotic factors, such as frontal shifts, and biotic factors, such as food composition, as they relate to abundance and distribution of zooplankton. (Auth.)

**B-58289**

Clarke, A., **Marine benthic populations in Antarctica: patterns and processes**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.373-388, Refs. p.385-388.

**DLC QH541.264.A6F67 1996**

Benthic marine invertebrates in Antarctica have species/abundance relationships similar to those found in temperate or tropical regions but, several striking examples of gigantism notwithstanding, most species are small. Diversity is generally high, although some taxa are low in diversity when compared with temperate or tropical faunas. Most species produce larger eggs than related non-polar species, and embryonic development is typically slow. Although the southern ocean contains fewer taxa reproducing by feeding pelagic larvae than elsewhere, such larvae are by no means absent. Post-juvenile growth rates are typically slow, and recruitment rates are slow and episodic. Ice is an important factor in many biological processes, and the recently described sub-decadal variability in the extent of winter sea-ice is likely to exert a profound influence on benthic ecological processes in Antarctica. (Auth. mod.)

**B-58293**

Palmer LTER Group, **Western Antarctic Peninsula region: summary of environmental and ecological processes**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.437-448, Refs. p.448.

**DLC QH541.264.A6F67 1996**

Overviews and syntheses of the many aspects and processes associated with the terrestrial and marine ecosystems in the western Antarctic Peninsula region are discussed. They are a foundation used as a basis for the Palmer Long-Term Ecological Research (LTER) program as well as a means for highlighting additional research opportunities and questions. This chapter is intended to indicate where linkages occur between systems and processes, and how the Palmer LTER builds upon and extends the understanding of ecological processes in the region west of the Antarctic Peninsula. (Auth. mod.)

**B-58295**

Zdzitowiecki, K., Cielecka, D., **Digenea of fishes of the Weddell Sea. II. The genus *Macvicaria* (Opaeoelidae)**, *Acta parasitologica*, Apr. 1997, 42(2), p.77-83, 12 refs.

Four hundred bony fishes caught at 120-1540 m in the Weddell Sea were examined; 63 fishes of 4 families occurring at depths of 120-590 m were infected with *Macvicaria* spp. Three species were recognized, including 2 new species, *M. microtestis* sp.n. and *M. longibursata* sp.n., and one species, *M. georgiana* previously recorded only in West Antarctica. *M. microtestis* sp.n. occurs in nototheniids and artemidraconids. Its testes are smaller than the ovaries. *M. longibursata* sp.n. occurs in two zoarcid species. Its cirrus sac extends to the ventral sucker. *M. georgiana* occurs in 8 species of the genus *Trematomus* and in *Cryodraco antarcticus*; 6 host species are new. A key to 7 species of the genus *Macvicaria* occurring in the Antarctic is presented. (Auth. mod.)

**B-58296**

Zdzitowiecki, K., Cielecka, D., **Digenea of fishes of the Weddell Sea. III. The Lepocreadiidae (genera *Neolepidapedon* and *Lepidapedon*), parasites of Notothenioidea**, *Acta parasitologica*, Apr. 1997, 42(2), p.84-91, 20 refs.

Three lepecreadiid digenean species of 2 genera, *Neolepidapedon* Manter, 1954 and *Lepidapedon* Stafford, 1904, occur in notothenioid fishes of the genera *Trematomus*, *Artemidraco*, *Pogonophryne*, *Bathydraco* and *Prionodraco* in the Weddell Sea. Descriptions of all species, including one new and 2 previously recorded in the high Antarctic, are given. *Neolepidapedon trematomi* is recorded in 4 host species, 3 of the genus *Trematomus* and *Pogonophryne permitini* for the first time in the Weddell Sea and south to 70°S. *Lepidapedon garrardi* and *L. balgueriasi* sp.n. belong to the "Beveridgei subgroup" of Bray and Gibson (1995). *L. balgueriasi* sp.n. is recorded in 4 species of the genus *Trematomus*. A key to species of the "Beveridgei subgroup" of the genus *Lepidapedon* is given. (Auth. mod.)

**B-58297**

Zdzitowiecki, K., White, M.G., Rocka, A., **Digenean, monogenean and cestode infection of inshore fish at the South Orkney Islands**, *Acta parasitologica*, Jan. 1997, 42(1), p.18-22, Refs. p.21-22.

Notothenioid fish of 3 species—23 immature *Notothenia coriiceps*, 4 *Gobionotothen gibberifrons* and 11 *Chaenocephalus aceratus*, from the coastal zone at the South Orkney Is. were examined to determine their parasite infection. Five digenean species from the intestine, one monogenean species from the skin, 2 tetraphyllidean larval forms (cercoids) from the intestine, and diphyllbothriid plerocercoids from the stomach's wall, liver and body cavity are reported. Infections are compared with those of fish from adjacent island groups along the Scotia Arc. Parasite infections of the fish from the South Orkney Is. are more similar to those from the South Shetland Is. area than at South Georgia. The infection of *N. coriiceps* and *G. gibberifrons* is similar to that of fjord fish at South Georgia and the South Shetland Is., whereas the parasite burden of *Ch. aceratus* is more similar to that of this fish species inhabiting the open sea. (Auth.)

**B-58298**

Zdzitowiecki, K., Cielecka, D., **Digenea of fishes of the Weddell Sea. I. Parasites of *Macrourus whitsoni* (Gadiformes, Macrouridae)**, *Acta parasitologica*, Jan. 1997, 42(1), p.23-30, Refs. p.29-30.

In total, 23 fishes caught at depth 625-1540 m were examined and 21 found to be infected with digeneans belonging to 6 species, 4 lepecreadiids in the intestine and 2 hemiurids in the stomach. Three lepecreadiid species are described as new: *Lepidapedon brayi* sp.n., *L. ninae* sp.n. and



*Paralepidapedon awii* sp.n. Some morphological data for other species are given. *Postlepidapedon opisthobifurcatus* and *Glomericirrus macrouri* are reported from the high Antarctic for the first time and in new hosts. *Gonocerca phycidis* Manter, 1925 is found in a new host. The total number of digenean species recorded in *M. whitsoni* increased from 2 to 8. (Auth.)

#### B-58302

Bölter, M., Blume, H.P., Schneider, D., Beyer, L., **Soil properties and distributions of invertebrates and bacteria from King George Island (Arctowski Station), maritime Antarctica**, *Polar Biology*, Nov. 1997, 18(5), p.295-304, Refs. p.303-304.

Soils of the Admiralty Bay region are described and analyzed for invertebrates and microorganisms. Results showed a great variety of soils; cambisols, umbrisols, regosols, podzols, leptosols, gleysols and relic ornithogenic soils were found. Surface layers, especially of cambisols, umbrisols and podzols, showed a diverse fauna, governed by nematodes, collembolids and mites. The bacterial flora is analyzed for total counts and biomass distribution in different layers using epifluorescence microscopy. Influences of soil organic matter can be described by different patterns of mean bacterial cell volumes related to soil cover and depth distributions. (Auth.)

#### B-58303

Carlini, A.R., Daneri, G.A., Marquez, M.E.I., Soave, G.E., Poljak, S., **Mass transfer from mothers to pups and mass recovery by mothers during the post-breeding foraging period in southern elephant seals (*Mirounga leonina*) at King George Island**, *Polar Biology*, Nov. 1997, 18(5), p.305-310, Refs. p.309-310.

Mass transfer from mother to pup during the lactation period, and mass recovery for the same females during the foraging period were measured in the southern elephant seal at King George I. During the  $19.2 \pm 0.9$  day lactation period measured (which represented 87% of the entire nursing), females lost a mean mass of  $10.56 \pm 1.76$  kg/day ( $n=27$ ), while their pups gained a mean mass of  $5.27 \pm 1.1$  kg/day. There was a correlation between daily body weight gain in pups and daily weight loss by their mothers. Pup weaning mass was positively related to maternal post-partum mass. Serial samples showed that weight losses by females and gains by their pups were not linear over lactation, but showed lower values at the beginning and at the end of lactation. The foraging period was shorter and the mass gained greater than those measured at South Georgia; this could be related to relatively shorter distances to foraging areas. (Auth. mod.)

#### B-58304

Lake, S.E., Burton, H.R., Hindell, M.A., **Influence of time of day and month on Weddell seal haul-out patterns at the Vestfold Hills, Antarctica**, *Polar Biology*, Nov. 1997, 18(5), p.319-324, 15 refs.

Regional and seasonal variation knowledge of activity patterns in seals is important for standardizing census methods and census data. This study quantified the diurnal pattern in haul-out behavior of Weddell seals at the Vestfold Hills from Oct. 1994 to Mar. 1995. Sequential counts of seals on the ice showed that, between 0900 and 1930 hours, seal abundance differed up to 95%. Fewer seals were hauled out in the morning than in the afternoon. The maximum numbers of seals were hauled out at the warmest time of day. The diurnal cycle was less pronounced in the breeding season than in the moulting season. The findings indicated the importance of censusing Weddell seals after 1430 hours and before 1700 hours local time, especially in the moulting season. Correction factors are given for month and time of day. (Auth. mod.)

#### B-58305

Van der Merwe, M., Chown, S.L., Smith, V.R., **Thermal tolerance limits in six weevil species (Coleoptera, Curculionidae) from sub-Antarctic Marion Island**, *Polar Biology*, Nov. 1997, 18(5), p.331-336, Refs. p.335-336.

Supercooling points, lower lethal temperatures, and the effect of short-term exposures to low temperatures were examined during both winter and summer in the adults of 6 weevil species from 3 different habitats on Marion I. Upper lethal limits and the effects of short-term exposure to high temperatures were also examined in summer-acclimatized adult individuals of these species, *Bothrometopus elongatus*, *B. paryulus*, *B. randi*,

*Ectemnorhinus marioni*, and *E. similis* were freeze tolerant, but had high lower lethal temperatures ( $-7$  to  $-10^\circ\text{C}$ ). Seasonal variation in these parameters was not pronounced. Physical conditions of the habitat appeared to have little effect on cold hardiness parameters because the *Ectemnorhinus* species occur in very wet habitats, whereas the *Bothrometopus* species inhabit drier areas. (Auth. mod.)

#### B-58306

Selkirk, P.M., et al, **Genetic variation in antarctic populations of the moss *Sarconeurum glaciale***, *Polar Biology*, Nov. 1997, 18(5), p.344-350, Refs. p.349-350.

Sixty-six isolates of the moss *Sarconeurum glaciale* were collected at Ross I., southern Victoria Land and the Vestfold Hills. Genetic variation within and among the populations was estimated using isozymes and random amplified polymorphic DNA (RAPD) technology. Isozyme results only reproducibly showed variation between the populations with one enzyme; RAPDs indicated significantly higher levels of genetic variability within and among the Vestfold Hills samples than in the Ross Sea region samples. A dendrogram produced from the RAPD bands suggested that the Ross I. and southern Victoria Land samples form one population, and those from the Vestfold Hills form a separate and more variable population, possibly resulting from separate colonization events on the continent. (Auth.)

#### B-58307

Rea, L., Groscolas, R., Mioskowski, E., Castellini, M., **Changes in plasma fatty acids indicate change in nutritional status in developing Weddell seal pups**, *Polar Biology*, Nov. 1997, 18(5), p.351-357, 22 refs.

The concentrations and the fatty acid compositions of 3 plasma lipid fractions were examined in 5 Weddell seal pups through suckling, the post-weaning fast and periods of independent foraging. The principal plasma fatty acids in Weddell seal pups during suckling were the same as those previously reported for milk samples collected from lactating Weddell seals. Significant changes in the fatty acid composition of plasma lipids occurred during suckling. These included an increase in the weight% of 20:4(n-6) and 18:0 in phospholipids, an increase of 20:4(n-6) in cholesterol esters, and an increase of 20:1(n-9) and a decrease of 20:5(n-3) in triacylglycerols. Weaning and the subsequent fasting period were accompanied by a dramatic drop in the plasma concentration and 14:0 content of triacylglycerols and by marked decrease and increase in the weight% of 20:1(n-9) and 20:5(n-3), respectively, in this lipid fraction. (Auth. mod.)

#### B-58308

Romano, N., Baldassini, M.R., Terribili, F.R., Abelli, L., Mastrolia, L., Mazzini, M., **Histological observations on lymphomyeloid organs of the antarctic fish *Trematomus bernacchii* (Teleostei: Nototheniidae)**, *Polar Biology*, Nov. 1997, 18(5), p.358-362, 18 refs.

Lymphomyeloid organs of the antarctic fish *Trematomus bernacchii* were studied with the aim of analyzing some morphological aspects related to adaptation to low environmental temperature. The thymus of *T. bernacchii* was flattened, incompletely lobated and scarcely regionalized. It was filled by lymphoid elements intermingled with stromal elements. The head kidney appeared highly vascularized and mainly lymphopoietic. The spleen appeared mainly erythropoietic, with scarcely developed areas of white pulp. (Auth.)

#### B-58309

Tveraa, T., Lorentsen, S.H., Sæther, B.E., **Regulation of foraging trips and costs of incubation shifts in the antarctic petrel (*Thalassoica antarctica*)**, *Behavioral ecology*, Sep./Oct. 1997, 8(5), p.465-469, 26 refs.

To examine how the body conditions of incubating antarctic petrels influence both the length of foraging trips and incubation shifts, the authors experimentally handicapped females by increasing their flight costs during a foraging trip by adding lead weights to their legs. Handicapped females spent more time at sea and had lower body conditions at arrival to the colony than controls. They spent generally more time at sea than those with higher body condition. The prolonged time period spent at sea by handicapped females was associated with higher desertion rates



than among controls. The time the incubating mates fasted increased with their body condition at arrival to the colony, suggesting that a high body condition of the incubating bird may reduce the probability of nest desertion. Results suggest that the time spent foraging is adjusted to the body conditions of both the foraging and incubating mate. (Auth.)

#### B-58311

Bell, C.M., Hindell, M.A., Burton, H.R., **Estimation of body mass in the southern elephant seal, *Mirounga leonina*, by photogrammetry and morphometrics**, *Marine mammal science*, Oct. 1997, 13(4), p.669-682, 24 refs.

A simple photographic technique was developed to indirectly estimate body mass data for southern elephant seal cows, yearlings, and immature males and females. Regressions of mass on both photographic and morphometric variables yielded useful, predictable models. Using such variables, the best estimation of the actual mass was for postlactation cows, with a 95% confidence interval of 2.66% of the predicted body mass. Although combining photographic and morphometric variables produced the most reliable models specifically for cows and yearlings, the most practical model contained only the morphometric variables length and girth squared. Side area was the best correlated single photographic variable and this corresponded with other studies. Photogrammetry could be useful when animals cannot be sedated and are located on a flat surface, but it does require animals to be motionless when approached. (Auth.)

#### B-58312

Wickens, P., York, A.E., **Comparative population dynamics of fur seals**, *Marine mammal science*, Apr. 1997, 13(2), p.241-292, Refs. p.285-292.

The population sizes, trends, exploitation, and life history parameters for 10 fur seal species and subspecies are summarized. The largest population is that of *Arctocephalus pusillus pusillus* with approximately two million seals, and the smallest is *A. townsendi* with approximately 7,000 individuals. Data on body masses are summarized and the paucity of data on consumption rates as a function of body mass noted. A simplified age-structured model is developed, and the results of this model are compared with results from more detailed models based on two published life tables for *Callorhinus ursinus*. This comparison shows that the use of the simplified age-structured model is justified to explore changes in population growth rate. However, the simplified model does show exaggerated age structure effects compared to the more detailed models. Antarctic and sub-antarctic species included in this survey are *A. tropicalis* and *A. gazella*. (Auth. mod.)

#### B-58313

Rogers, T.L., Bryden, M.M., **Density and haul-out behavior of leopard seals (*Hydrurga leptonyx*) in Prydz Bay, Antarctica**, *Marine mammal science*, Apr. 1997, 13(2), p.293-302, 42 refs.

The spatial distribution of leopard seals along the fast-ice edge in the austral spring and summer of 1992 and 1993 in Prydz Bay was determined by aerial surveys. Fewer individuals were observed within the area, and the seals observed were larger, in 1992 than in 1993. Comparison of the distributions and relative sizes of the seals suggests that there may be an age-related difference in spatial behavior. The greater degree of separation among older seals may be due to intraspecific aggression increasing with age, a hypothesis supported by the high incidence of intraspecific scarring noted on leopard seals in this region. The seals' haul-out behavior was negatively related to wind-chill index. (Auth.)

#### B-58314

Viarengo, A., Ponzano, E., Dondero, F., Fabbri, R., **Simple spectrophotometric method for metallothionein evaluation in marine organisms: an application to Mediterranean and antarctic molluscs**, *Marine environmental research*, July 1997, 44(1), p.69-84, 49 refs.

A highly sensitive, simple, low-cost spectrophotometric technique for the evaluation of the metallothionein content in the tissues of marine organisms is described. The method was applied to quantify the metallothionein concentration in the tissues of both Mediterranean and antarctic molluscs sampled from the field or experimentally exposed to sublethal (nmol to  $\mu$ mol) concentrations of heavy metals. In addition, the method

was used to study the relationship between Zn content and metallothionein levels in the digestive gland of *M. galloprovincialis* during an annual cycle.

#### B-58315

Clarke, A., Prothero-Thomas, E., **Influence of feeding on oxygen consumption and nitrogen excretion in the antarctic nemertean *Parborlasia corrugatus***, *Physiological zoology*, Nov./Dec. 1997, 70(6), p.639-649, 62 refs.

The large nemertean *Parborlasia corrugatus* is common in nearshore benthic marine habitats around Antarctica. Oxygen consumption and nitrogen excretion rates in worms freshly sampled from the field were low but similar to those reported for other polar marine ectotherms. Nitrogen was excreted primarily as ammonia, with smaller amounts of urea and amines. The O:N atomic ratio was low, indicating that free or protein-derived amino acids were important metabolic substrates. When worms were fed at ration levels ranging from 20% to 110% of body mass, both oxygen demand and ammonia excretion increased after feeding in a classic specific dynamic action response. Peak postprandial oxygen consumption was low and the duration of the specific dynamic action was unusually long. Both the energy used and the nitrogen excreted in the specific dynamic action scaled with meal size, although the fractions of ingested carbon and nitrogen used or lost were both very low. It is concluded that *P. corrugatus* has only a limited ability to increase its metabolic rate following a meal and takes many days to process that meal fully. (Auth. mod.)

#### B-58316

Boyce, S.J., Clarke, A., **Effect of body size and ration on specific dynamic action in the antarctic plunderfish, *Harpagifer antarcticus* Nybelin 1947**, *Physiological zoology*, Nov./Dec. 1997, 70(6), p.679-690, 66 refs.

The feeding energetics of the antarctic spiny plunderfish were examined with respect to the effect of both ration size and animal size. Fish of different sizes were fed single meals at one of two ration levels to determine the maximum aerobic scope that could be elicited by the specific dynamic action. Neither fish size nor ration had any effect on the factorial aerobic scope of feeding. The factorial scope in ammonia excretion was affected by both ration and fish size, indicating that respiration and excretion respond to a meal independently. The duration of the specific dynamic action response increased with fish size but not ration, whereas both the time to reach the peak oxygen consumption and the duration of the ammonia response increased with ration but not fish size. The percentage of the ingested energy that was expended following feeding was high at low rations but lower at satiation rations. This is because the absolute energetic cost of processing a meal was largely independent of meal size. The change in O:N ratios after feeding was very ration-dependent. (Auth. mod.)

#### B-58323

Arkhipkin, A.I., Silvanovich, N.V., **Age, growth and maturation of the squid *Martialia hyadesi* (Cephalopoda, Ommastrephidae) in the south-west Atlantic**, *Antarctic science*, Dec. 1997, 9(4), p.373-380, Refs. p.380.

The statolith microstructure was studied in 142 females and 119 males of *Martialia hyadesi* caught at the Antarctic Polar Frontal Zone between 1989-94. Assuming daily production of putative growth increments within statoliths, males live up to 12 months and females up to 13 months. Immature squids with ages >330-340 d suggest that a part of *M. hyadesi* populations could have a life span >1 yr. Growth in length was best described by the Gompertz function; growth in weight was best described by the logistic function. *M. hyadesi* is characterized by slow juvenile growth, fast growth of immature squids and a sharp decrease in growth rates during maturation. *M. hyadesi* mature later than other temperate ommastrephids. In the southwest Atlantic, *M. hyadesi* hatch throughout the year. (Auth. mod.)

#### B-58324

Bernardi, G., Goswami, U., **Molecular evidence for cryptic species among the antarctic fish *Trematomus bernacchii* and *Trematomus hansonii***, *Antarctic science*, Dec. 1997, 9(4), p.381-385, 10 refs.



The notothenid species *Trematomus bernacchii* has previously been shown, by allozyme analysis, to be a complex of 2 cryptic species, one of which being more closely related to *T. hansonii* than to the other *T. bernacchii* cryptic species. Two *T. bernacchii* color morphs, "white blotch" and "brown", at McMurdo Sound, may correspond to these cryptic species. In this study, the authors present mitochondrial DNA sequences of the 12S and 16S ribosomal regions for 6 "white blotch" morphs, 8 "brown" morphs collected in McMurdo Sound, one individual collected off the Antarctic Peninsula, and 2 *T. hansonii* individuals from McMurdo Sound. These sequences were compared with those of *T. bernacchii* and *T. hansonii* in the literature. Based on 14 phylogenetically informative sequences, no differences were found between "white blotch" and "brown" morphs. (Auth. mod.)

#### B-58325

Iken, K., Barrera-Oro, E.R., Quartino, M.L., Casaux, R.J., Brey, T., **Grazing by the antarctic fish *Notothenia coriiceps*: evidence for selective feeding on macroalgae**, *Antarctic science*, Dec. 1997, 9(4), p.386-391, Refs. p.390-391.

In Potter Cove, macroalgae provide a significant food resource for herbivores. The demersal fish *Notothenia coriiceps* feeds on macroalgae. Eighteen algal species were identified in stomach contents: 2 chlorophytes, 10 rhodophytes and 6 phaeophytes. Among these the rhodophyte *Palmaria decipiens*, the phaeophyte *Desmarestia menziesii* and the chlorophyte *Monostroma hariotii* comprised the greatest proportions of algal biomass. A food selection study showed 4 algae to be preferred (*P. decipiens*, *M. hariotii*, *D. menziesii*, *Iridaea cordata*) and 2 species to be avoided (*Desmarestia anceps* and *Himantothallus grandifolius*) by *N. coriiceps*. The present investigation indicates that this fish feeds not only intentionally, but also selectively, on macroalgae. Preference for particular algal species is not related to associated epifaunal biomass or to associated amphipod biomass. (Auth.)

#### B-58326

McClintock, J.B., Karentz, D., **Mycosporine-like amino acids in 38 species of subtidal marine organisms from McMurdo Sound, Antarctica**, *Antarctic science*, Dec. 1997, 9(4), p.392-398, Refs. p.397-398.

Mycosporine-like amino acids (MAAs) that absorb UV radiation (310-360 nm) were investigated in 34 species of benthic marine invertebrates, 2 species of benthic fish and 2 species of red algae collected during the spring of 1992 from McMurdo Sound. In addition, MAAs were measured in the ripe ovaries, testes and brooded juveniles of four species of echinoderms. While 90% of the species had MAAs in their tissues, both quantitative and qualitative measurements reflected a general lack of UV protectants among these fauna. Eight MAAs were detected among the species examined, but only 4 of these occurred in any appreciable number of the species. Palythanol only occurred in the sponge *Isodictya erinacea* and asterina-330 and palythene only occurred in the red alga *Iridaea cordata*. MAAs were detected in the ripe ovaries and testes of the sea urchin *Sterechinus neumayeri* and in the sea cucumber *Cucumaria ferrari*. (Auth. mod.)

#### B-58327

Swadling, K.M., Gibson, J.A.E., Ritz, D.A., Nichols, P.D., **Horizontal patchiness in sympagic organisms of the antarctic fast ice**, *Antarctic science*, Dec. 1997, 9(4), p.399-406, Refs. p.405-406.

Metazoan abundance, chlorophyll concentration and salinity were measured in 54 sea ice cores. The metazoan fauna was dominated by nauplii of the copepod *Paralabidocera antarctica*. Other copepods present included *Stephos longipes*, *Oncaea curvata*, *Oithona similis*, *Ctenocalanus citer*, and unidentified harpacticoid copepods. Chlorophyll *a* concentrations were generally much higher than values recorded at other antarctic coastal sites at the same time of the year, reaching a maximum of 78 mg/m<sup>2</sup>. Metazoan abundances did not correlate strongly with chlorophyll or salinity. Significant variability in abundance of *P. antarctica* and *O. similis*, and chlorophyll concentration occurred at the scale of kilometers, whereas salinity and other metazoan abundances were not significantly variable at any of the scales examined. (Auth. mod.)

#### B-58328

Takahashi, M., Iwami, T., **Summer diet of demersal fish at the South Shetland Islands**, *Antarctic science*, Dec. 1997, 9(4), p.407-413, 20 refs.

The stomach contents of demersal fish in late Jan. 1982 were analyzed. Samples were taken at 100, 300 and 500 m depth south of Elephant I., Bransfield Strait and north of Livingston I., and at 800 m to the east of Smith I. Fifty-four taxa of fish belonging to 11 families were collected. The diets of 2101 fish representing 38 taxa were examined. These were classified into 3 categories, fish feeders, krill feeders and benthos feeders. Fish prey species fed on krill and/or benthos. Krill was a major dietary component for 32 (84.2%) out of 38 taxa. *Gobionotothen gibberifrons* was distributed at all 10 stations (100-800 m in depth) and its diet comprised krill and benthos. The present findings verify the importance of krill in the antarctic marine ecosystem and indicate that krill is consumed by benthic fish at greater depths than previously reported. (Auth.)

#### B-58329

Van Den Brink, N.W., De Ruiter-Dijkman, E.M., **Trans-nonachlor, octachlorostyrene, mirex and photomirex in antarctic seabirds**, *Antarctic science*, Dec. 1997, 9(4), p.414-417, 11 refs.

Octachlorostyrene (OCS) and trans-nonachlor (TNC) were detected in cape petrels of King George I., which tallies with their presence in samples of gentoo penguins of the Falkland Is. The detection of TNC in a sample of the antarctic southern fulmar implies that the antarctic region has been contaminated by this compound. Mirex and photomirex were also detected in samples of the cape petrels and southern fulmar, as well as in Adélie penguins from Hop I. The ratios of the mirex and photomirex concentrations in the truly antarctic species from different locations are similar, which suggests that these compounds are diffusely distributed over the continent. The detection of organochlorine pollutants in antarctic seabirds is an indication that these compounds have a global distribution. (Auth. mod.)

#### B-58330

Van De Vijver, B., Beyens, L., **Freshwater diatoms from some islands in the maritime antarctic region**, *Antarctic science*, Dec. 1997, 9(4), p.418-425, Refs. p.421-422.

A total of 69 diatom taxa, belonging to 24 genera were recorded from 13 freshwater and moss samples collected in the Antarctic Peninsula region. Marine taxa comprised 26%. Cluster analysis revealed 3 assemblages. The *Nitzschia acidoclinata* assemblage occurs on wet mosses; the *Luticola muticopsis* assemblage is found near penguin rookeries, whereas the *Pinnularia krookii*-*Pinnularia microstauron* var. *elongata* assemblage occurs on drier places, such as dry mosses and drying mud. (Auth.)

#### B-58341

Hagelin, J.C., Miller, G.D., **Nest-site selection in South Polar Skuas: balancing nest safety and access to resources**, *Auk*, Oct. 1997, 114(4), p.638-645, 20 refs.

Skuas experience both reproductive costs and benefits when nesting near Adélie penguins. The authors present a conceptual model to show that skua nest placement is based on two mechanisms: nest safety and access to penguins. Skua nests close to subcolonies of breeding penguins are likely to suffer greater egg loss due to egg trampling by penguins and predation by other skuas. However, skuas nesting near penguins potentially benefit from direct access to penguin eggs and chicks. Given these reproductive tradeoffs, skuas should exhibit an optimal nesting distance relative to penguin subcolonies. Skua pairs located at the optimal distance minimize egg loss while maximizing access to penguin eggs and chicks. During four breeding seasons they monitored skua nest placement relative to breeding penguins and recorded the fate of all skua eggs and chicks. The results supported the safety and access mechanisms of the model. (Auth. mod.)

#### B-58346

Duhamel, G., **Ichthyofauna of the subantarctic islands** [L'ichtyofaune des îles australes françaises de l'océan Indien], *Cybium*, May 30, 1997, 21(1)suppl., p.147-168, In French with English summary. Refs. p.164-168.



Few differences occur between Crozet and Kerguelen Is. ichthyofauna, except for the absence of the family Channichthyidae around the group of islands located between the subantarctic and antarctic regions. Similarities are strong between St-Paul/Amsterdam (Indian Ocean) and Tristan da Cunha/Gough (South Atlantic Ocean) ichthyofauna, both found also around other islands and seamounts in a circum-subtropical belt excluding the continental shelves. Distribution of the midwater ichthyofauna follows the influence of successive and parallel hydrological fronts from the southern ocean, evidenced by the presence of Myctophidae, the dominant family in all 3 sectors. (Auth. mod.)

#### B-58350

Sedwick, P.N., DiTullio, G.R., **Regulation of algal blooms in antarctic shelf waters by the release of iron from melting sea ice**, *Geophysical research letters*, Oct. 15, 1997, 24(20), p.2515-2518, 27 refs.

During summer 1995-96, the authors measured iron in the water column and conducted iron-enrichment bottle-incubation experiments at a station in the central Ross Sea, first, in the presence of melting sea ice, and 17 days later, in ice-free conditions. They observed a striking temporal change in mixed-layer dissolved iron concentrations at this station with sea ice present, or in ice-free conditions. The authors surmise that bioavailable iron was released into seawater from the melting sea ice, stimulating phytoplankton production and the biological removal of dissolved iron from the mixed layer, until iron-limited conditions developed. These observations suggest that the episodic release of bioavailable iron from melting sea ice is an important factor regulating phytoplankton production, particularly ice-edge blooms, in seasonally ice-covered antarctic waters. (Auth. mod.)

#### B-58351

De Marino, S., et al, **Isolation, structure elucidation, and biological activity of the steroid oligoglycosides and polyhydroxysteroids from the antarctic starfish *Acodontaster conspicuus***, *Journal of natural products*, Oct. 1997, 60(10), p.959-966, 27 refs.

A total of 19 steroids has been isolated from the antarctic starfish *Acodontaster conspicuus*. The mixture is dominated by glycosides composed of steroidal aglycons having the hydroxyl groups typically disposed on one side of the tetracyclic nucleus, with some having a sulfate at C-6, and differing in the side chains and/or in the disaccharide moieties that are usually attached at C-26, with some at C-28 and C-29. The structures of the compounds were determined by interpretation of their spectral data and by comparison with spectral data of known compounds. Eighteen of these compounds were evaluated for their ability to inhibit growth in antarctic marine bacteria isolated from either the water column or the surfaces of benthic marine invertebrates. Of these, 50% were active against at least one antarctic marine bacterium. (Auth. mod.)

#### B-58352

Weykam, G., Thomas, D.N., Wiencke, C., **Growth and photosynthesis of the antarctic red algae *Palmaria decipiens* (Palmariales) and *Iridaea cordata* (Gigartinales) during and following extended periods of darkness**, *Phycologia*, Sep. 1997, 36(5), p.395-405, Refs. p.404-405.

Thalli of red algae *Palmaria decipiens* (Reinsch) Ricker and *Iridaea cordata* (Turner) Bory were kept in darkness for a period of 6 mo, simulating winter sea ice cover. Subsequently, they were grown illuminated under seasonally fluctuating antarctic daylengths. The amount of floridean starch decreased gradually in the dark, with a sudden drop simultaneous with the development of new blades. After reexposure to light there was a rapid increase in photosynthetic oxygen production. The increase in growth rate showed a close relation to carbon assimilation. Together with the ability to photosynthesize, starch accumulation facilitates survival during extended dark periods in winter. The early development of blade initials and the rapid increase in photosynthetic capability after illumination may permit *P. decipiens* to use the period of high water transparency optimally in antarctic spring. *I. cordata* seems better able to survive prolonged dark periods in areas with less predictable light conditions. Both physiological patterns are well suited to the highly seasonal light conditions in Antarctica. (Auth. mod.)

#### B-58353

Gibbons, M.J., **Pelagic biogeography of the South Atlantic Ocean**, *Marine biology*, Oct. 1997, 129(4), p.757-768, Refs. p.766-768.

The biogeography of the South Atlantic was investigated using presence/absence data for euphausiids. The resulting biogeography is the most complete to date and can be usefully compared with the biogeochemical provinces for the region. A total of 6 biogeographic provinces were identified from similarity analyses of the 246 five-degree grid squares. These correspond to antarctic, subantarctic, cold temperate, warm temperate (subtropical) and tropical waters, as well as the Agulhas Current. Congruence with the biogeochemistry of the region is good in the south and emphasizes the important determinate role of temperature. However, the biogeography fails to identify coastal and tropical biogeochemical provinces. This can be attributed to the fact that while adjoining areas may share many species in common, their assemblages differ in their quantitative composition. This serves to emphasize differences in provincial functioning. (Auth. mod.)

#### B-58354

Erb, E., Shaughnessy, P.D., Norman, R. J de B., **Dental and mandibular injury in an Antarctic Fur Seal, *Arctocephalus gazella*, at Heard Island, Southern Ocean**, *Journal of wildlife diseases*, Apr. 1996, 32(2), p.376-380, 14 refs.

The skull of an adult male antarctic fur seal (*Arctocephalus gazella*) collected at Heard I. Oct. 1992, had chronic changes attributable to a fracture of the left lower canine, luxation of the mental symphysis, osteomyelitis of the left and right mandibles, and periostitis of the left maxilla. (Auth.)

#### B-58355

Dawbin, W.H., **Temporal segregation of humpback whales during migration in Southern Hemisphere waters**, *Queensland Museum. Memoirs*, June 30, 1997, 42(1), p.105-138, 7 refs.

All available data on post-war catches and some pre-war catches of humpback whales in the Southern Hemisphere between 66°S and 1°S have been examined for evidence that some age or reproductive categories migrate north, and south early in the season, while others follow in sequence later. Humpbacks appear to return south in the same order in which they travelled north, but some females change status so that those that travel north early when near the end of lactation, may return south early as pregnant animals. Others that travel north late as pregnant animals, return south late as cows accompanied by young calves. Mature females, when pregnant, appear to spend a prolonged period in antarctic waters but when suckling a calf they spend a substantially reduced interval in cold waters. Antarctic catches appear to have been taken over too short a season to demonstrate sequences during the entry and exit of humpbacks to antarctic waters. (Auth. mod.)

See also:

A-56500 A-56504 A-57490 E-56363 E-56372 E-56379 E-56416  
E-56468 E-56576 E-56667 E-56754 E-56768 E-56784 E-56791  
E-56901 E-56902 E-56903 E-56930 E-57003 E-57046 E-57068  
E-57069 E-57070 E-57071 E-57072 E-57073 E-57091 E-57092  
E-57137 E-57204 E-57255 E-57271 E-57432 E-57507 E-57508  
E-57617 E-57641 E-57642 E-57643 E-57798 E-57799 E-57813  
E-57879 E-57880 E-57889 E-57896 E-57897 E-57996 E-58001  
E-58050 E-58075 E-58178 E-58317 F-56662 F-57251 F-57727  
F-58217 F-58274 G-56558 G-56572 G-56648 G-57776 G-57886  
G-57964 I-56646 I-56767 I-57125 I-57126 I-57132 I-57526  
I-58071 I-58257 J-56484 J-56499 J-56528 J-56541 J-56661  
J-56742 J-57106 J-57107 J-57116 J-57182 J-57183 J-57184  
J-57185 J-57186 J-57187 J-57188 J-57191 J-57193 J-57196  
J-57202 J-57203 J-57409 J-57411 J-57442 J-57527 J-57570  
J-57616 J-57659 J-57684 J-57718 J-57734 J-57788 J-57920  
J-58049 J-58052 J-58168 J-58188 M-56386 M-56465 M-56769  
M-56771 M-57024 M-57646



## C. CARTOGRAPHY

### C-56563

Shibuya, K., Fukuda, Y., Michida, Y., **Determination of geoid height at Breid Bay, East Antarctica**, *Journal of geophysical research*, Oct. 10, 1991, 96(B11), p.18,285-18,294, 21 refs.

#### DLC QC811.J6

By the combined observation of satellite Doppler positioning, Global Positioning System (GPS) relative carrier phase measurement, and ocean tide observation, the authors obtained the geoid height at Breid Bay as 16.8 m above the World Geodetic System 1984 (WGS84) Earth ellipsoid. The broadcast ephemeris satellite Doppler positioning was made, and the ellipsoidal height at L0 point on the ice sheet of Breid Bay is estimated to an accuracy of  $\pm 4$  m from the accepted 95 Navy Navigation Satellite System (NNSS) satellite passes. GPS relative carrier phase measurement was made between L0 point and the deck of the icebreaker *Shirase* (S point). The height difference between L0 point and S point is determined to an accuracy of  $\pm 0.3$  m from the analysis of 15-min carrier phase data from four satellites by the doubly differenced phase method. The recording of sea level variation was made using the sea bottom pressure-transducer water level recorder for 4 days, together with monitoring of ship's attitude and meteorological data. The separation of S point from the local mean sea level is determined to an accuracy of  $\pm 0.3$  m. (Auth. mod.)

### C-56622

Nath, A.N., **Remote sensed data analysis for geology and glacial geology of Wohlthat Muhlig-Hofmann mountain chain in Queen Maud Land, East Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.385-418, 6 refs.

#### DLC G850.I53 I53

During the Fifth Indian Expedition to Antarctica, aerial surveys were conducted over the Schirmacher Hills and Gruber and Petermann massives in eastern part of the Wohlthat Mountains. Spectral signatures of sea-ice, fast-ice, shelf-ice, continental-ice and lithological units were collected. Maps on a 1:250,000 scale for the region covering the area from 3°E to 21°E were prepared. The main drainage glaciers, the local glaciers and their associated morainic deposits were identified. Sastrugi fields, nunataks, solid crystalline blue ice fields, their distribution, melt water channels, and grounded ice have been demarcated. Thermal mapping of Schirmacher Hills was also conducted. Digital analysis to classify the rock types, to enhance the structural features, to differentiate the occurrence of various types of ice sheets and locate the solid crystalline ice fields which are typically associated with nunataks and mountains, has been carried out. (Auth. mod.)

### C-56643

Srivastava, V.P., Madhwal, H.B., Prim, A., **Orthometric height determination using GPS in East Antarctica**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.145-150, 5 refs.

Observations including geoid measurements were made in East Antarctica during the 10th Indian expedition. The Global Positioning System (GPS) provides three dimensional coordinates—latitude, longitude and height—with reference to the World Geodetic System 84 (WGS 84) ellipsoid. This paper describes a method by which the heights above the Instantaneous Mean Sea Level (IMSL) can be obtained in an inaccessible area where classical techniques for determination of MSL cannot be adopted. The main drawback in this method is that data have to be collected over a long period of time and from different sites. (Auth. mod.)

### C-56644

Srivastava, V.P., Madhwal, H.B., **Geographical control in East Antarctica**, Scientific report, Tenth Indian Expedition to Antarc-

tica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.151-154.

During the Tenth Indian Expedition to Antarctica, geodetic and geophysical controls were established in the area of the Schirmacher Ponds and the surrounding nunataks, for map making and future scientific explorations. Global Positioning System (GPS) receivers were used by the Survey of India scientists for establishing the precise positions of the selected locations. (Auth.)

### C-56714

Carsey, F., Wales, C., **Future opportunities and issues in radar remote sensing of Earth's high latitudes**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.1, New York, Institute of Electrical and Electronics Engineers, 1996, p.634-635.

#### DLC QE33.2.R4I57 1996

The Alaska SAR Facility (ASF) is now downlinking data for science and operational users from four satellites: the European ERS-1 and -2, the Japanese JERS-1, and the Canadian RADARSAT. Among higher-level products envisioned are a complete RADARSAT SAR map of Antarctica and ERS Tandem Mission fringe maps of Antarctica and parts of Alaska. (Auth. mod.)

### C-56719

Cuddy, D., Leung, K., **Alaska SAR Facility overview in the Radarsat era**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.2, New York, Institute of Electrical and Electronics Engineers, 1996, p.1358-1360, 4 refs.

#### DLC QE33.2.R4I57 1996

The Alaska SAR Facility at the University of Alaska, Fairbanks, which archives synthetic aperture radar data from the European ERS-1, ERS-2, and Japanese JERS-1 satellites, has installed a receiving station at McMurdo, Antarctica, to include data from the Canadian RADARSAT, launched in Nov. 1995. The facility at McMurdo is expected to be operational in mid-1996 and will provide daily satellite data including flight information.

### C-56722

Norikane, L., Wilson, B., Jezek, K.C., **RADARSAT Antarctica Mapping System: system overview**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.3, New York, Institute of Electrical and Electronics Engineers, 1996, p.1772-1774, 1 ref.

#### DLC QE33.2.R4I57 1996

In Oct. 1996, RADARSAT will map the entire antarctic continent from space, presenting scientists with an unprecedented snapshot of the entire continent in the microwave spectrum. NASA has charged the Byrd Polar Research Center with the goal of producing a full continental map using this data, subject to a number of constraints to maximize the utility of the data to the scientific community. To meet these requirements, a number of SAR data processing techniques shall be applied including orthorectification processing, block adjustments for ephemeris refinements, simulation techniques and radiometric balancing for automated image seam removal. These techniques shall be implemented in the RADARSAT Antarctica Mapping System being developed by Vexcel Corporation for the Byrd Polar Research Center. (Auth. mod.)

### C-56723

Jezek, K.C., et al, **RADARSAT: the Antarctic Mapping Project**,



International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.3, New York, Institute of Electrical and Electronics Engineers, 1996, p.1775-1776, 2 refs.

**DLC QE33.2.R4I57 1996**

On Nov. 4, 1995, the Canadian RADARSAT was carried aloft by a NASA rocket launched from Vandenberg Air Force Base. RADARSAT is equipped with a C-band Synthetic Aperture Radar (SAR) capable of acquiring high resolution (25 m) images of Earth's surface day or night and under all weather conditions. Along with the attributes familiar to researchers working with SAR data from the European Space Agency's Earth Remote Sensing Satellite and the Japanese Earth Resources Satellite, RADARSAT will have enhanced flexibility to collect data using a variety of swath widths, incidence angles and resolutions. Most importantly, for scientists interested in Antarctica, the agreement for a U.S. launch of RADARSAT includes a provision for rotating in orbit the normally right-looking SAR to a left-looking mode. This 'Antarctic Mode' will provide for the first time a nearly instantaneous, high resolution view of the entirety of Antarctica on each of two proposed mappings separated by 2 years. This is an unprecedented opportunity to finish mapping one of the few remaining uncharted regions of the Earth. (Auth. mod.)

**C-56724**

Wales, C., **McMurdo Ground Station (MGS): ready for SAR acquisition**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.3, New York, Institute of Electrical and Electronics Engineers, 1996, p.1777-1779.

**DLC QE33.2.R4I57 1996**

The McMurdo Ground Station (MGS), a satellite receiving facility on Ross I., was installed in Dec. 1994 by the Ground Networks Division of NASA in concert with the Office of Polar Programs of NSF. Its original purpose was to acquire synthetic aperture radar (SAR) data from the Canadian RADARSAT spacecraft, which was launched in Nov. 1995. To test the system, SAR data from the European ERS-1 spacecraft was successfully acquired by MGS in Jan. 1995 and processed at the Alaska SAR Facility (ASF). The role of the MGS has expanded to include other SAR missions, and its first major role is to support the ERS-1 and ERS-2 tandem mission. The tandem mission should collect three complete coverages of the McMurdo mask during the first half of 1996. In late spring MGS will start receiving and recording SAR data from RADARSAT. Data recorded in summer are expected to be shipped every two weeks; all winter data will be shipped on the first flight out in the spring. (Auth. mod.)

**C-56725**

Williams, J., **Calibration of data from the Antarctic Mapping Mission**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.3, New York, Institute of Electrical and Electronics Engineers, 1996, p.1780-1782, 4 refs.

**DLC QE33.2.R4I57 1996**

In Oct. of 1996 the RADARSAT SAR will acquire high resolution C-band radar data over the entirety of Antarctica. The mission will last for a period of about 18 days, during which 12 hours of data or approximately 3300 SAR images will be acquired. A substantial effort will be undertaken at the Alaska SAR Facility to ensure that all downlinked data is successfully acquired. To support calibration of the dataset, two transponders have been built and deployed in Antarctica. These transponders, together with other calibration targets in Alaska, Canada and Brazil will be used to calibrate the data. (Auth.)

**C-56846**

Muramoto, K., Yamanouchi, T., **Classification of polar satellite data using image features and decision tree classifier**, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.10, Tokyo, National Institute of Polar Research, 1996, p.127-137, 12 refs.

In the polar region, it is difficult to discriminate between clouds and ground surface from satellite visible or infrared data, because of the high albedo and low surface temperature of snow and ice cover. In this paper, a method to classify clouds, sea ice and ground is proposed. This study is

based upon analysis of the NOAA/AVHRR infrared images in Antarctica. The algorithm consists of two major approaches: estimating image features and a classification algorithm. A decision tree classifier is designed to classify the region into one of 3 classes using 6 image features. Though sea ice and ground can be largely separated using only one feature, more than 3 features are necessary to separate clouds. (Auth.)

**C-57038**

Yi, D., Bentley, C.R., **Retracking algorithm for satellite radar altimetry over an ice sheet and its applications**, U.S. Army Cold Regions Research and Engineering Laboratory. Special report, Oct. 1996, SR 96-27, p.112-120, ADA-321 342, 19 refs.

Both surface scattering and volume scattering contribute energy to satellite-radar-altimeter return waveforms over a continental ice sheet. Here, the authors present a retracking algorithm that includes surface scattering and volume scattering, and, for the first time, also includes the surface topography, the satellite pointing angle and the curvature of the earth in both the surface-scattering and volume-scattering models. The algorithm can yield surface elevation values for individual waveforms. At the same time, quantitative estimates of the surface roughness and signal penetration and their regional and seasonal variations can be obtained. The authors have applied the algorithm to Geosat data over a section (69°S-72.1°S and 80°E-140°E) of East Antarctica. Generally, the spatial variation of the parameters is not a function of elevation, but is related to the drainage systems. Seasonal variations show clearly from 80°E to 95°E but are not very clear from 96°E to 140°E. The results are compared with those of previous retracking systems. (Auth.)

**C-57048**

Lliboutry, L., **Schematic maps of the ice fields of Patagonia and Tierra del Fuego at 1:500 000** [Mapas esquematicos de los campos de hielo de Patagonia y Tierra del Fuego al 1/500 000], 1981, 4 sheets, In Spanish.

This representation comprises four charts covering portions of Tierra del Fuego and southern Patagonia. Three charts extend northward from about 51.5°S to approx. 46.5°S, between approx. 72.7°W and 74.3°W. A fourth chart is laid out in an E-W orientation extending in Tierra del Fuego northward in southern Patagonia below the eastern end of the Strait of Magellan, roughly from Beagle Channel westward to Ballenero Channel (55.0°S/67.5°W to 54.5°S/70.5°W). Depicted within the area of these charts are the many glaciers and divers water bodies which make up the ice fields. The charts are based on aerial surveys of the region made in Jan.-Feb. 1947 by personnel of the USAF. The charts themselves were constructed in 1981.

**C-57074**

Kilpatrick, D., Williams, R., **Unsupervised classification of antarctic satellite imagery using Kohonen's self-organising feature map**, IEEE International Conference on Neural Networks, Perth, Australia, Nov. 27-Dec. 1, 1995. Proceedings, Volume 1, Piscataway, Institute of Electrical and Electronics Engineers, 1995, p.32-36, 10 refs.

**DLC QA76.87.I3437**

This paper describes an investigation into the use of Kohonen's Self-Organising Feature Map (SOM) for the classification of remotely sensed imagery of Antarctica. The SOM is an unsupervised neural network which is trained using unlabelled input data. The network consists of a grid of nodes and, after training, each node corresponds to a prototype vector in the input data space. In order to use the trained SOM as an image classifier it is necessary to calibrate the grid of prototype vectors whereby the prototype vectors are clustered and these clusters mapped to physical class labels. The K-means iterative clustering technique is demonstrated as a means of performing this clustering. (Auth. mod.)

**C-57380**

Casacchia, R., Salvatori, R., Petrangeli, A., **Geologic mapping in Victoria Land, Antarctica, based on multispectral satellite data**, SPIE—The International Society for Optical Engineering. Proceedings, 1995, Vol.2587, Geographic information systems, photogrammetry, and geological/geophysical remote sensing, edited by J.B. Lurie, J. Pearson and E. Zilioli, p.2-9, 9 refs.



**DLC G70.212.G4456 1995**

Image processing techniques have been applied to Landsat TM images of Victoria Land to enhance both the spectral contrast and the spatial information. The test site is located west of the Terra Nova Bay area, south of the terminal part of the Priestly Glacier and includes mountainous ranges characterized by alpine morphology, a large plateau and valley glaciers. Rock units are mainly constituted by a metamorphic complex, granitoids and supraglacial moraines. A method based on principal component transform and on high-pass convolution filtering has allowed to produce an image map where the spectral and the spatial information of the different surface units were combined. The detection of outcrop boundaries has been improved as well as the visual interpretation of their morphologic features. In general rock units corresponds to those mapped by means of geological field survey. Morainic deposits are well discernible from the *in situ* material appearing different, after processing, in texture and color from the intrusives and metamorphic Complexes. (Auth.)

**C-57541**

Schöne, T., **Gravity field in the Weddell Sea, Antarctica, by radar altimetry from GEOSAT and ERS-1** [Ein Beitrag zum Schwerefeld im Bereich des Weddellmeeres, Antarktis, Nutzung von Altimetermessungen des GEOSAT und ERS-1], *Berichte zur Polarforschung*, 1997, No.220, 145p., In German with English summary. Refs. p.127-136.

Radar altimeter measurements carried out by the satellites GEOSAT and ERS-1 were analyzed. This work focuses mainly on the computation of gravity anomalies in ice covered regions, especially in the Weddell Sea. Due to the permanent sea ice coverage in the southern oceans, only a reduced number of sub-satellite tracks could be used for these investigations. New algorithms and strategies were developed. At first the radar altimeter measurements were corrected for various effects, e.g. ionospheric and tropospheric delays or tides. Then, a collinear analysis and a crossover adjustment were combined with robust outlier detection algorithms. Finally, averaged height profiles were extracted from repeat orbits and used for the computation of gravity anomalies and the mean sea surface. By combining the measurements from ERS-1 and GEOSAT a significant improvement of the resolution of the models was achieved. The altimeter data were also used for the determination of an improved sea surface height model. (Auth. mod.)

**C-57610**

Elizavetin, I. V., Ksenofontov, E. A., **Results of investigation of the antarctic scene by SAR "ALMAZ-1" using interferometric processing**, European Conference on Synthetic Aperture Radar, Königswinter, Germany, Mar. 26-28, 1996. Proceedings. EUSAR '96, Berlin, VDE-Verlag, 1996, p.257-260, 2 refs.

**DLC TK6592.S95 E96**

This paper presents the advances in SAR interferometry using "Almaz-1" satellite data. Quality images were obtained on adjacent cycles for an antarctic coastal site with glacier tongue, grounded and sea ice fields and icebergs. The interferograms reveal glacier elevation and show the results of iceberg pressure on the ice sheets. Specific questions of interferometric processing are analyzed. The results of compensation for velocity vectors differences caused by nonsynchronous orbits are illustrated on phase pictures. (Auth. mod.)

**C-57844**

Hernández Cifuentes, F., **Geodesy and topography of Livingston and Deception islands** [Trabajos geodésicos y topográficos del Servicio Geográfico del Ejército en las islas Livingston y Decepción (Antártida)], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.291-302, In Spanish with English summary.

Geodetic and topographic surveys carried out on Livingston and Deception islands since the 1986 Spanish Antarctic Expedition, and resulting in the publication of 5 topographic maps of the area, are reported. Methods and techniques used, including geodetic network positioning, photogrammetry and aerial images, are described. Details of the Byers Peninsula and Deception I. maps, based on field work of the 1991-92 and 1992-93 expeditions, are shown and discussed.

**C-57988**

Mullen, R. R., Mullins, J. L., **Surveying and mapping program of the United States in Antarctica**, *Revista cartografica*, June 1996, No.64, p.103-105, With Spanish summary.

This paper reviews the United States Geological Survey's Antarctic Surveying and Mapping program in support of the United States Antarctic Program. It discusses topographic mapping and geodetic surveys, satellite imaging mapping, south pole program, U.S. SCAR Map Library and the United States gazetteer of geographic names. It also describes cooperative mapping programs with the Argentine Antarctic Institute to map Seymour I. and McMurdo Dry Valleys mapping with the New Zealand Department of Surveys and Land Information. (Auth.)

**C-58173**

Chen, C. M., E, D. C., Shi, Q., **Quality analysis of Fildes deformation monitoring network**, *Chinese journal of polar research*, Mar. 1997, 9(1), p.66-70, In Chinese with English summary. 2 refs.

The synthetic quality estimate of antarctic Fildes deformation-monitoring-network is studied based upon statistical test theory and the appreciable error testing. The reliability and the sensitivity of the deformation-monitoring-network is discussed, with the conclusion that the network's performance in monitoring crustal shear movements of the Fildes Strait-fault is satisfactory. (Auth. mod.)

See also:

A-56411 A-57487 B-58311 E-57620 E-58039 E-58055 F-56452  
F-56471 F-56565 F-56608 F-56711 F-56726 F-56776 F-56993  
F-57100 F-57208 F-57211 F-57357 F-57505 F-57550 F-57557  
F-57750 F-57840 F-57874 F-57917 F-57999 F-58166 F-58193  
F-58230 F-58233 F-58265 F-58266 I-57531 I-57699 I-57700  
I-57701 I-58033 I-58041 J-57117 J-57803 J-58087 J-58267  
L-56515



## D. EXPEDITIONS

### D-56472

India. Department of Ocean Development, **Scientific report of Fourth Indian Scientific Expedition to Antarctica**, New Delhi, India, 1987, 208p., Technical publication No.4, Refs. passim. For individual papers see A-56485, B-56481 through B-56483, E-56474, E-56478, F-56476, F-56477, F-56479, G-56486 through G-56488, I-56480, J-56484, L-56473, L-56475 or 51-1959 through 51-1967.

### DLC G850.I53I53 1984

This technical report gives the details of the work carried out, by members of the Fourth Indian Scientific Expedition to Antarctica during 1984-1985, in the following disciplines: geology, geophysics, meteorology, biology and oceanography. Sixteen papers are included, the last 4 dealing with history of Maitri Station, fire resistant paint, polymer chemistry and renewable energy systems, respectively.

### D-56532

India. Department of Ocean Development, **Scientific report of Ninth Indian Expedition to Antarctica**, New Delhi, India, 1994, 311p., Technical publication No.6, Refs. passim. For individual papers see B-56538 through B-56540, B-56548, B-56551, D-56533, E-56542 through E-56546, E-56548, F-56549, F-56550, G-56554 through G-56558, H-56552, H-56553, I-56536, I-56537, J-56541, K-56534, K-56535, L-56547 or 51-2082 through 51-2092.

This technical report gives details of the work carried out by members of the Ninth Indian Expedition to Antarctica, from Nov. 1989 to Mar. 1991, in the following disciplines: atmospheric and terrestrial physics, meteorology, biology, geology, glaciology and human physiology. Twenty-six papers are included; the first, and the last five, deal with the expedition's logistics.

### D-56533

Ravindra, R., **Ninth Indian scientific expedition to Antarctica - events & achievements**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.1-20, 2 refs.

The scientific and logistic tasks carried out during the 9th Indian expedition to Antarctica are outlined; and details of the voyage and the launching of the expedition program are described. Among the major achievements listed is the setting up of a modern meteorological observatory and a greenhouse at Maitri Station, and exploration of the Humboldt Mountains. Investigations in different disciplines were carried out in that area during the winter season.

### D-56591

India. Department of Ocean Development, **Scientific report of Fifth Indian Expedition to Antarctica**, New Delhi, India, 1988, 487p., Technical publication No.5, Refs. passim. For individual papers see B-56615 through B-56618, B-56629, C-56622, D-56592, E-56593 through E-56598, E-56600, E-56605, F-56599, F-56601 through F-56604, F-56606 through F-56609, G-56623 through G-56626, G-56628, I-56610 through I-56614, I-56627, K-56620, I-56621, L-56619 or 51-2263 through 51-2282.

### DLC G850.I53 I53

This technical report gives details of the work carried out by members of the Fifth Indian Expedition to Antarctica, from Nov. 1985 to Mar. 1986, in the following disciplines: geology, glaciology, marine biology, meteorology, geophysics, radiophysics, geomagnetism, use of non-conventional sources of energy, remote sensing and logistics. Thirty-eight papers are included.

### D-56592

Kaul, M.K., **Fifth Indian Voyage to Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.25-53, 1 ref.

### DLC G850.I53 I53

The Fifth Indian Expedition to Antarctica left India on Nov. 30, 1985 and reached Dakshin Gangotri Station on Dec. 24, 1985. The expedition started its return journey on Mar. 3, 1986 after completing all its objectives. This paper gives a brief account of how the expedition was conducted and the tasks that were achieved, both in the scientific and logistic categories. (Auth. mod.)

### D-56632

India. Department of Ocean Development, **Scientific report, Tenth Indian Expedition to Antarctica**, New Delhi, India, 1995, 297p., Technical publication No.8, Refs. passim. For individual papers see B-56647, B-56649 through B-56652, C-56643, C-56644, D-56633, E-56640 through E-56642, G-56648, G-56656, G-56657, H-56653 through H-56655, I-56634 through I-56638, I-56646, L-56639, L-56645 or 51-2302 through 51-2307.

This technical report gives details of the work carried out by members of the Tenth Indian Expedition to Antarctica, from Nov. 1990 to Feb. 1992. The scientific papers incorporated in this issue cover atmospheric science, bio-science, earth science, human physiology, oceanography, and polar horticulture. Twenty-five papers are included; the first is a review of the expedition, and the last two deal with the expedition's logistics.

### D-56633

Hanjura, A.K., **Tenth Indian Antarctic Expedition - A review**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.1-16, 2 refs.

Logistics and scientific tasks carried out during the 10th Indian antarctic expedition are outlined, and details of the voyage are given. Activities listed include the establishment of an advanced summer camp in the southernmost part of the Humboldt Mountains and in the Petermann Ranges, installation of a generator, installation and operation of an acoustic sounder, and the transportation of all the fuel and all the hydrogen cylinders from Dakshin Gangotri to Maitri Station.

### D-57502

Mawson, D., **Home of the blizzard: the story of the Australasian Antarctic Expedition, 1911-1914**, Kent Town, Australia, Wakefield Press, 1996, 438p.

### DLC G850 1911.M32 1996

This work, first published in two volumes in 1915, was published again as an abridged, one-volume, popular edition in 1930. The present volume is a condensed version of the abridged popular edition, featuring original images from the Mawson Collection. The book is a detailed account of Sir Douglas Mawson's Australasian Antarctic Expedition, from its preparations and its departure from Hobart in late 1911 to the collection of the remainder of Mawson's party by the ship *Aurora* in early 1914. *Home of the Blizzard* describes the expedition's domestic life on Antarctica, its scientific endeavors, the difficulties of travel, the setting up of the first radio communications from the continent and story of Mawson's epic sledge journey in 1912-13 during which his companions Ninnis and Mertz both perished.

See also:

A-57487 B-57737 G-58138 K-56851



## E. GEOLOGICAL SCIENCES

### E-56348

Matsuoka, N., **Measurements and experiments on geomorphic processes in antarctic ice-free mountains: a review**, *Antarctic record*, July 1996, 40(2), p.179-201, In Japanese with English summary. Refs. p.198-201.

The dynamic approaches to geomorphic processes in antarctic ice-free areas, most of which lie in the cold desert zone, are reviewed. A variety of methodologies have been used to measure rock weathering, wind erosion, frost heave, slope processes and patterned ground formation. Whereas a number of attempts have been made to quantify rates of erosion or mass movements, difficulties in long-term, continuous monitoring have hindered understanding of the physical processes that control the rates. Recent progress in automated data logging techniques enables the authors to acquire data on the timing and cause of geomorphic changes. These data, combined with cosmogenic exposure ages, are applied to the reconstruction of Late Cenozoic landscape evolution. It is suggested that experimental techniques should be standardized to promote intersite comparisons of morphogenetic environments. (Auth. mod.)

### E-56354

Collinson, J.W., Eggert, J.T., Kemp, N.R., **Triassic sandstone petrology of Tasmania: evidence for a Tasmania-Transantarctic Basin**, *Royal Society of Tasmania. Papers and proceedings*, Oct. 1990, 124(1), p.61-75, Refs. p.74-75.

DLC Q93.T2 1990

Similar fluvial sequences of Triassic age occur in Tasmania and the Transantarctic Mountains. The Tasmanian reference section at Poatina consists of Lower Triassic quartzose fluvial sandstones overlain by Middle and Upper Triassic volcanoclastic fluvial sandstones and shale containing coal. Similar, but less well-exposed sequences, occur in many places in Tasmania and in southern Victoria Land. The hypothetical Tasmania-Transantarctic basin was similar in scale, configuration, and history to the Sydney foreland basin. Palaeocurrent data suggest that streams flowed along the axis of the basin from Antarctica to Tasmania. Lower Triassic sandstones were deposited by braided streams, but Middle and Upper Triassic stream deposits change from braided to meandering downstream toward Tasmania. Quartzose sandstones in the Lower Triassic were derived from northwestern Tasmania and the East Antarctic craton. The source of volcanoclastic sandstones in the Middle and Upper Triassic was a calcalkaline volcanic arc along the palaeo-Pacific margin. (Auth.)

### E-56363

Wharton, R.A., **Stromatolitic mats in antarctic lakes**, Phanerozoic stromatolites II. Edited by J. Bertrand-Sarfati and C. Monty, Dordrecht, Netherlands, Kluwer Academic Publishers, 1994, p.53-70, Refs. p.68-70.

DLC QE955.P47 1994

Stromatolitic microbial mats composed primarily of bacteria, cyanobacteria, eukaryotic algae are found in the cold, dimly-lit perennially ice-covered antarctic lakes of southern Victoria Land. The morphology of a particular mat results from a combination of biological, geochemical, and sedimentological processes, some of which may be unique to ice-covered lakes. Prostrate, lift-off, columnar, and pinnacle mats are trapping, binding and/or precipitating carbonates and various other minerals forming organosedimentary structures. The ice-covered lakes of Antarctica may serve as an important model for understanding the formation of stromatolites in cold environments. Studies of antarctic stromatolitic mats enhance the understanding of the range of environmental conditions capable of supporting stromatolite formation, particularly cold facies including those present during the Precambrian. (Auth.)

### E-56367

Maldonado, A., et al, **Tectonics and paleoceanography in the**

**northern sector of the Antarctic Peninsula: Preliminary results of HESANT 1992/93 cruise with the B/O HESPERIDES**, *Scientia marina*, Mar. 1993, 57(1), p.79-89, With Spanish summary. 19 refs.

DLC SH285.I6

The boundaries between the plates located in the northern sector of the Antarctic Peninsula were investigated during the B/O *Hesperides* HESANT 92-93 cruise using multichannel seismic profiles, magnetometry, and multibeam echo sounding. The investigation focused on the analysis of the tectonic relationships between the main lithospheric elements of the area and the paleoceanographic evolution of the continental margins and basins during the Upper Cenozoic. The triple junction defined by the southern end of the Shackleton Fracture Zone, the South Shetland Trench and the South Scotia Ridge shows a compressive structure where tectonic blocks and deep rooted diapirs develop. The boundary between the Scotia and antarctic plates is characterized by a succession of structural highs, which represent continental crustal blocks, and intervening transtensive basins bounded by strike-slip faults. The Powell Basin and the continental margins of the Antarctic Peninsula in the Weddell Sea show several evolutionary styles which may represent an asymmetric opening of the basin and the relative importance of extensional and strike-slip faults in its development. (Auth.)

### E-56372

Long, J.A., **New groenlandaspidid arthrodire (Pisces; Placodermi) from the Middle Devonian Aztec Siltstone, southern Victoria Land, Antarctica**, *Western Australian Museum. Records*, May 1995, 17(1), p.35-41, Refs. p.40-41.

*Boomeraspis goujeti* gen. et sp. nov is described from isolated trunk-shield plates found in the basal 30 m of Aztec Siltstone exposed at Alligator Peak in the Boomerang Range of southern Victoria Land. *Boomeraspis* is characterized by its broad posterior dorsolateral plate (PDL) which has an inflected main lateral line canal and a strongly convex dorsal margin, and the posterior lateral plate (PL) features a strong lateral ridge. These features place *Boomeraspis* as a primitive member of the family Groenlandaspidae, distinguished from both *Tiaraspis* and *Groenlandaspis* by its proportionately longer PDL, strongly ridged and larger PL, and also by the long posterior division of the ventral lamina on the PVL plate. (Auth.)

### E-56374

Barkov, N.I., Nikolaev, V.I., Strizhov, V.P., **On the genesis of mirabilite in the McMurdo Sound region, Antarctica**, *Lithology and mineral resources*, July-Aug. 1995, 30(4), p.374-379, 26 refs. For Russian original see 51-1238 or 24E-56246.

The genesis of mirabilite is considered on the basis of new data on the isotopic composition of oxygen from natural ice and sulfur from mirabilite of moraine deposits in the McMurdo Sound region. It was inferred that both the primarily marine and endogenic sources of this salt were present, but this does not permit one to use the deposits of this salt for paleogeographic reconstructions. (Auth.)

### E-56379

Oleinik, A.E., Zinsmeister, W.J., **Paleocene diversification of bucciniform gastropods on Seymour Island, Antarctica**, *Journal of paleontology*, Nov. 1996, 70(6), p.923-934, 75 refs.

The appearance of four new species belonging to the new genus *Seymourosphaera*, tentatively placed in the subfamily Pseudolivinae, from the lower Paleocene strata of Seymour I., Antarctic Peninsula, clearly illustrates post-Cretaceous extinction diversification. The abrupt radiation of the buccinids during the early Paleocene, was also apparently related to geographic isolation of Antarctica during final breakup of Gondwana. Comparative analysis of shell morphology of *Seymourosphaera*, new genus reveals close morphologic similarities, not only with taxa within Pseudolivinae, but also with several genera and subgenera



belonging to the families Buccinidae and Nassariidae. The following new species of genus *Seymourosphaera* new genus are described: *Seymourosphaera bulloides* new species, *S. subglobosa* new species, *S. depressa* new species, and *S. elevata* new species. (Auth. mod.)

#### E-56414

Dilek, Y., **Mode and nature of continental rifting along the northwestern periphery of Gondwanaland during the break-up of Pangea**, *Canadian Society of Petroleum Geologists. Memoir*, Dec. 1994, No.17, Pangea: global environments and resources. Edited by A.F. Embry, B. Beauchamp and D.J. Glass, p.113-121, With French summary. Refs. p.120-121.

**DLC QE511.5.P354 1994**

Triassic to Lower Cretaceous rift assemblages and passive margin sequences in the eastern Mediterranean region evolved as a result of continental rifting processes along the northern edge of Gondwanaland. Stratigraphic and palaeontological evidence from volcanic and sedimentary rocks of the rift assemblages indicate episodic rift magmatism in pulses in Mid- to Late Triassic, Late Jurassic and Early Cretaceous times. A significant time gap between the initial continental break-up (Triassic) and the first episode of seafloor spreading (Late Cretaceous) is supported by age relations between the rift assemblages and the ophiolites. It is concluded that the main driving force for the Triassic dispersal of Gondwanaland in the northwest might have been related to subduction-plate boundary forces similar to the proto-Pacific margin of Antarctica. (Auth. mod.)

#### E-56415

Francis, J.E., **Palaeoclimates of Pangea - geological evidence**, *Canadian Society of Petroleum Geologists. Memoir*, Dec. 1994, No.17, Pangea: global environments and resources. Edited by A.F. Embry, B. Beauchamp and D.J. Glass, p.265-274, With French summary. Refs. p.273-274.

**DLC QE511.5.P354 1994**

Palaeoclimates of Pangea (mid-Carboniferous to mid-Jurassic) range from glacial to hot and arid. During the Late Carboniferous extensive Gondwanan glaciation began, firstly with ice caps in South America and Australia in tectonically active regions where land was uplifted to high altitudes. The focus of glaciation moved from western Gondwana across South Africa, India, Antarctica and Australia as the South Pole shifted eastwards, until the last remnants of glaciation disappeared in the Late Permian. The hypothesis that Pangean climates were dominated by monsoonal-type circulation, related to Pangean continental configuration, which reached maximum strength during the Triassic is presented. The Early Triassic suggests the climate was very arid for a while but gradually became wetter in the Late Triassic and Early Jurassic. (Auth. mod.)

#### E-56416

Francis, J.E., Woolfe, K.J., Arnott, M.J., Barrett, P.J., **Permian climates of the southern margins of Pangea: evidence from fossil wood in Antarctica**, *Canadian Society of Petroleum Geologists. Memoir*, Dec. 1994, No.17, Pangea: global environments and resources. Edited by A.F. Embry, B. Beauchamp and D.J. Glass, p.275-282, With French summary. 32 refs.

**DLC QE511.5.P354 1994**

Fossil wood is present within the Weller Coal Measures of late Early Permian age at Allan Hills, southern Victoria Land, Transantarctic Mountains. It is preserved within coals and fluvial sediments as permineralized upright stumps and drifted trunks, along with *Glossopteris* leaves and *Vertebraria* rootlets. These fossils represent forests of *Glossopteris* trees that grew in swamps on the floodplain of a large meandering river (or rivers) at latitudes of about 80°S. The presence of a glacially striated boulder and other indicators of glacial environments within the sediments suggests that ice was present on surrounding highlands. Growth rings in the fossil wood are wide and uniform, are formed of a large number of cells and do not show frost damage. They indicate that tree growth was rapid during warm growing seasons, but slowed gradually as conditions deteriorated. Evidence from plant fossils and sediments shows that the climate was seasonal, with warm summers and cold, possibly freezing winters. (Auth.)

#### E-56419

LeMasurier, W.E., Landis, C.A., **Mantle-plume activity recorded by low-relief erosion surfaces in West Antarctica and New Zealand**, *Geological Society of America. Bulletin*, Nov. 1996, 108(11), p.1450-1466, Refs. p. 1465-1466.

Mantle-plume activity has been proposed to explain Neogene and mid-Cretaceous magmatic events, as well as associated tectonism, in West Antarctica; but the arrival time and dimensions of plume influence have been hard to define and are still a subject of debate. Two low-relief erosion surfaces, one in West Antarctica and the other in New Zealand provide a way of assessing plume activity by measuring vertical displacements associated with these events. Both surfaces bevel mid-Cretaceous rocks, and both represent prolonged intervals of erosional leveling in a stable tectonic environment. The present elevation of the West Antarctic erosion surface records an estimated maximum of  $\approx 3$  km of tectonic uplift, associated with alkalic volcanism, beginning at ca. 28-30 Ma. This event marks the inception of plume activity in West Antarctica. The resulting structure, the Marie Byrd Land dome, defines an area of plume influence that is smaller than the area defined by geochemistry, but is similar in scale to the Yellowstone plume. (Auth. mod.)

#### E-56447

Kerr, A., Gilchrist, A.R., **Glaciation, erosion and the evolution of the Transantarctic Mountains, Antarctica**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.303-308, 20 refs.

Modelling studies of the tectonic evolution of the Transantarctic Mountains have drawn differing conclusions as to the primary mechanism involved. None has considered the role of the East Antarctic ice sheet in detail. The authors use a denudation-flexural model to examine the isostatic response of the continental margin to glacial erosion to determine whether glacial processes have played a role in forcing mountain uplift. The conclusion is that, although there are insufficient data formally to delimit the role of glacial erosion, available geophysical and geomorphological data are not inconsistent with the results of the differential denudation model, providing certain conditions are met. These results indicate that the current topography of the Transantarctic Mountains can be simulated, in part, from the isostatic response of the lithosphere to glacial erosion. (Auth. mod.)

#### E-56466

Coren, F., Giorgetti, F., Pescatore, T., Senatore, M.R., **Single-channel seismic profiles of cenozoic sedimentary successions in Terra Nova Bay** [Le successioni sedimentarie della Baia Terra Nova - bacino Drygalski (Mare di Ross, Antartide): interpretazioni di profili sismici monocanale], *Giornale di geologia. Serie terza*, Oct. 1993, 55(1), p.155-163, In Italian with English summary. Refs. p.162-163.

**DLC QE1.G65**

The single-channel seismic survey carried out during summer 1990-91 revealed the cenozoic sedimentary successions in the Ross Sea. The Drygalski Basin is one of 3 rift basins on the Ross continental shelf. Rifting and early sedimentation probably started during the Middle Jurassic with a second rifting and sedimentary filling from Early Oligocene. A Late Oligocene-Early Miocene sequence is linked to the variations in position of the glacier margin. Two main seismic units were recognized in the seismic profiles of Terra Nova Bay and Drygalski Basin; they are separated from the regional unconformity called Victoria Land Unconformity (VLU). The upper seismic unit (S2) has been interpreted as strongly influenced by the changes in glacial conditions due to the progressive ice sheet expansion that started in Late Oligocene. Therefore, the age of the S2 unit is estimated to be Late Oligocene-Early Miocene. The lower seismic unit (S1), dated Early Oligocene, has been interpreted as deposited in a marine basin below wave base in an environment insensitive to variations in position of the glacier margin. S1 unit would be linked to the rifting started in the Middle Jurassic. (Auth. mod.)

#### E-56468

Phipps, C.J., Taylor, T.N., **Mixed arbuscular mycorrhizae from the Triassic of Antarctica**, *Mycologia*, 1996, 88(5),



p.707-714, Refs. p.713-714.

Arbuscular mycorrhizae are the most ubiquitous of mycorrhizal fungi, that have formed mutualistic relationships with virtually almost all major groups of vascular plants. Five genera of arbuscular endomycorrhizal fungi are currently delineated, but fossil arbuscular mycorrhizae have been allied with only two, *Glomus* and *Sclerocystis*. A Triassic arbuscular mycorrhiza described inhabiting the roots of *Antarcticycas* was originally allied with *Glomus*. It is now known to be a mixed colony comprised of fungi attributable to the suborders Glomineae and Gigasporineae of the Glomales, described as two new species. The fossil Gigasporinean mycorrhiza is characterized by irregularly swollen intercellular and intracellular hyphae that are coiled extensively within the cells. Arbuscules have thick trunks and narrow branches. In the Glominean form, hyphal diameter is more uniform, with coiling rarely present. Arbuscules have thin trunks and fine branches. Vesicles may be lateral or terminal. Spores are not present; therefore, the probability of more than one species of each suborder being represented cannot be conclusively demonstrated. This provides the first fossil representative of the Gigasporineae and supports current rDNA estimates of the age of the lineage. Moreover, it is the first reported instance of a mixed colony of arbuscular endomycorrhizae in the fossil record. (Auth.)

#### E-56474

Verma, S.K., Mital, G.S., Dayal, A.M., **K-Ar dating of some rocks from the Schirmacher Oasis, Dronning Maud Land, East Antarctica**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.43-54, Refs. p.53-54.

#### DLC G850.I53I53 1984

Geochronological studies were carried out on nine rock samples collected from the Schirmacher Ponds region of Queen Maud Land. Four of these samples belong to the crystal-line basement forming part of the East Antarctica shield while the other samples are from the dolerite dykes occurring in the region. Various ages obtained for these two groups of rocks reveal valuable information on the evolution of the Queen Maud Land and on the palaeo-relationship of Antarctica and Africa. (Auth.)

#### E-56478

Verma, S.K., Mital, G.S., Rao, G.V., Rangarajan, R., Reddy, K.N.S., Venkatarayudu, M., **Radioactivity measurements on some rock and water samples from Dakshin Gangotri, Antarctica**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.93-98, 1 ref.

#### DLC G850.I53I53 1984

Field measurements and laboratory analyses were carried out on some rock and water samples from the Dakshin Gangotri Station region. It was found that no significant deposits of radioactive minerals exist in the vicinity of Priyadarshini Lake. The water samples collected from the water channels in the ice shelf and from Priyadarshini Lake were found to be free of any hazardous radioactive contaminations. (Auth.)

#### E-56496

Stüwe, K., Ehlers, K., **Qualitative zoning record of minerals. A method for determining the duration of metamorphic events?**, *Mineralogy and petrology*, 1996, 56(3-4), p.171-184, With German summary. Refs. p.182-184.

The efficacy of ion exchange in petrological systems, for example the Fe-Mg exchange between garnet and biotite, is a function of grain-size, temperature, rates of temperature change and diffusion parameters. The combination of these variables determines the final zoning profile of minerals. Therefore, zoning profiles may be used to derive one of these variables if the others are known. A parameterization of the critical grain size may be used to illustrate the relative importance of grain size, temperature and event duration to the equilibration of minerals. In this paper, the critical grain size is parameterized for various temperature-time cycles and its dependence on diffusion parameters is discussed. For illustration, the authors compare the results with the critical grain size of garnets from two metamorphic terranes, the Prydz Bay region (Antarctica) and the Koralm complex (Eastern Alps). Despite the

large range of uncertainties attached to the method, it is shown that the critical grain size of garnets in both terranes is consistent with a very short duration of the last thermal event that affected the two regions. (Auth. mod.)

#### E-56503

Hagen, E.H., **Geochemical and petrological investigation of meteorite ablation products in till and ice of Antarctica (Mt. Achnar moraine)**, The Ohio State University, 1996, 525p., University Microfilm order No.DA95-44576, Ph.D. thesis. Refs. p.516-525.

Meteorite ablation products from till and ice were recovered from the Mt. Achnar Moraine area. These specimens were studied to characterize the grain size distribution, abundance, chemistry, and petrology of spherules from Antarctica. The bulk composition of spherules and the chemical composition of known meteorite classes were used to devise a classification system for spherules based on discriminant functions analysis. In addition, the pre-atmospheric history of six spherules were modelled, and the exposure history of sandstone clasts on the Mt. Achnar Moraine was determined by using cosmogenic radionuclides. The exposure history of the moraine allowed an evaluation of the chemical composition of spherules trapped in the moraine sediment through time. Details of the exposure history are provided. (Auth. mod.)

#### E-56512

Moriwaki, K., ed, NIPR Symposium on Antarctic Geosciences, 15th, Tokyo, Oct. 26-27, 1995, **Proceedings of the NIPR Symposium on Antarctic Geosciences, No.9**, Tokyo, National Institute of Polar Research, 1996, 154p., Refs. passim. For individual papers see E-56516 through E-56524 and L-56513 through L-56515.

This volume contains the proceedings of the 15th Symposium on Antarctic Geosciences held in Tokyo Oct. 26-27, 1995. It comprises 12 papers arranged by scientific fields as follows: solid earth geophysics, geology, and marine geology and geophysics. Data were obtained in the regions from Sør Rondane Mountains to the Ross Sea and around the Antarctic Peninsula.

#### E-56516

Ishizuka, H., Suzuki, S., Kojima, H., **Meta-ultramafic rock from the Austkampane area of the Sør Rondane Mountains, East Antarctica**, NIPR Symposium on Antarctic Geosciences, Proceedings. No.9, Tokyo, National Institute of Polar Research, 1996, p.40-48, 16 refs.

In the Austkampane Hills, a meta-ultramafic rock occurs as a lenticular block enclosed within the host garnet-biotite gneiss of the granulite facies. The rock consists of olivine, orthopyroxene, amphibole, spinel, apatite, ilmenite, magnetite, chalcopyrite and pentlandite. The bulk rock analysis shows an ultramafic composition in a broad sense, but compared with mantle peridotites it is enriched in TiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, CaO, Nb and Zr, and has a slightly high ratio of FeO\*/MgO. This suggests a slightly differentiated basaltic cumulate as its precursor. After the igneous generation, the rock was incorporated within the original rock of the host gneiss (sedimentary quartzo-feldspathic rock), probably in the form of block-in-matrix, and then both rocks underwent the granulite facies metamorphism. The olivine-spineal geothermometer and Al<sub>2</sub>O<sub>3</sub> content of orthopyroxene indicate metamorphic temperatures of about 780-820°C and 750-800°C, respectively. Similar meta-ultramafic rocks have been reported from the Lützow-Holm Complex, suggesting that the similar association of original rocks such as oceanic lower crusts developed in these two granulite terrains. (Auth.)

#### E-56517

Asami, M., Suzuki, K., Adachi, M., **Monazite ages by the chemical Th-U-total Pb isochron method for pelitic gneisses from the eastern Sør Rondane Mountains, East Antarctica**, NIPR Symposium on Antarctic Geosciences, Proceedings. No.9, Tokyo, National Institute of Polar Research, 1996, p.49-64, Refs. p.62-64.



Chemical Th-U-total Pb isochron (CHIME) ages were determined with an electron microprobe analyzer on 14 to 24 monazite grains in three garnet-biotite gneisses collected from separate outcrops in the eastern part of the Sør Rondane Mountains. A two-stage metamorphic history is proposed for the Sør Rondane Mountains: an earlier regional granulite-facies event, inferred from U-Pb zircon and Rb-Sr and Sm-Nd whole rock data to be ca. 1000 Ma in age, and an amphibolite-facies overprint, inferred to be ca. 500 Ma in age. PbO-ThO<sub>2</sub>\* plots based on ThO<sub>2</sub>, UO<sub>2</sub> and PbO contents of monazites yield a well-defined isochron for each gneiss. The isochrons give 536, 534 and 534 Ma ages, indicating a single crystallization age (ca. 535 Ma) for the monazites. This age is in good agreement with the ca. 500 Ma age currently assigned to the amphibolite-facies overprint. However, the high Pb retentivity reported for monazite, along with textural and mineralogical characteristics of the samples, constrains assignment of the monazite age to the granulite-facies metamorphism rather than to retrograde recrystallization. (Auth. mod.)

#### E-56518

Motoyoshi, Y., **Pseudotachylite from McIntyre Island, Enderby Land, East Antarctica: evidence for a rapid crystallization**, NIPR Symposium on Antarctic Geosciences, Proceedings. No.9, Tokyo, National Institute of Polar Research, 1996, p.65-75, Refs. p.73-75.

Pseudotachylite from McIntyre I. occurs in a breccia zone composed of black material with glassy luster and fragments of host pyroxene gneiss which has undergone ultra-high temperature metamorphism as a constituent of the Archean Napier Complex. Under the optical and electron microscopes, the rock in the zone demonstrates a distinct sheared texture with extremely fine-grained materials, a part of which may be a glass. Abundant euhedral garnets occur in the fine-grained part, and their chemical compositions are quite heterogeneous from domain to domain. In view of the evidence that no garnet was observed in the host pyroxene gneiss, these garnets are likely to have crystallized very rapidly in the melt or solidified melt. Because of the chemical heterogeneity of garnet in the pseudotachylite even in a small domain, it is highly difficult to estimate the P-T conditions by means of geothermobarometric techniques using the mineral chemistries of microlites. (Auth.)

#### E-56519

Lee, J.I., Hwang, J., Kim, H.C., Kang, C.Y., Lee, M.J., Nagao, K., **Subvolcanic zoned granitic pluton in the Barton and Weaver Peninsulas, King George Island, Antarctica**, NIPR Symposium on Antarctic Geosciences, Proceedings. No.9, Tokyo, National Institute of Polar Research, 1996, p.76-90, Refs. p.89-90.

The subvolcanic granitic pluton on Barton and Weaver peninsulas is mainly composed of granodiorite with small volumes of gabbro, diorite and aplitic dikes. The pluton shows a vertically compositional zonation; the lower part consists of gabbro and diorite, whereas the upper part is mainly granodiorite. Various geochemical signatures of the pluton confirm that all subunits of the pluton were formed by accumulation and fractionation in a calc-alkaline magma at a shallow level of the crust. The positive Sr and Eu anomalies as well as textural features of gabbro strongly support that gabbro was the cumulate derived from accumulation of calcic plagioclase and *in situ* crystallization of ferromagnesian minerals. Taking into account the geochemical features of gabbro as a cumulate, the primary magma of the pluton is considered to have been intermediate (dioritic or quartz dioritic) in composition. (Auth.)

#### E-56520

Ishihara, T., Tanahashi, M., Sato, M., Okuda, Y., **Preliminary report of geophysical and geological surveys of the west Wilkes Land margin**, NIPR Symposium on Antarctic Geosciences, Proceedings. No.9, Tokyo, National Institute of Polar Research, 1996, p.91-108, 16 refs.

Geophysical and geological surveys of the Wilkes Land margin were conducted in the 1994-95 austral summer season. The survey area covers the continental slope and rise as well as Bruce Rise in the western end of the margin. Sediments above the basement in the survey area are divided into 6 sequences. The continent-ocean boundary (COD) occurs at about 64°S, and total thickness of sediments exceeds 5 s in two-way

time around the COB in the eastern part of the survey area. Bottom simulating reflectors are frequently observed in the continental slope area. A conspicuous unconformity is observed in Bruce Rise. The basement almost crops out near the northern and eastern ends of the rise, and the sequences below the unconformity dip west to southwest. (Auth.)

#### E-56521

Kagami, H., **Erosional topography observed on the upper continental rise, Wilkes Land, East Antarctica**, NIPR Symposium on Antarctic Geosciences, Proceedings. No.9, Tokyo, National Institute of Polar Research, 1996, p.109-116, Refs. p.115-116.

Erosional topography is recognized on the upper continental rise between 123° and 134°E off Wilkes Land. Erosion of the upper continental rise up to roughly 500 m is observed on seismic lines and is considered to be caused by down-slope density currents of cold shelf water or by thermohaline induced contour currents of antarctic bottom water. Development of the abyssal channel systems is another bit of evidence that sediments are swept off the sea floor to create erosional depressions on the upper continental rise off Wilkes Land. Because these eroding currents are only active and effective at the continental margin around Antarctica, erosional depressions of the upper continental rise are responsible for formation of the antarctic margin type. (Auth.)

#### E-56522

Nishimura, A., Yuasa, M., Nakasone, T., Nakahara, M., Ioka, N., **Sedimentological study of the sea bottom sediments in and around the Ross Sea continental shelf, Antarctica**, NIPR Symposium on Antarctic Geosciences, Proceedings. No.9, Tokyo, National Institute of Polar Research, 1996, p.117-126, 18 refs.

Sediment cores collected in and around the Ross Sea are described and discussed based on visual observations, sedimentary structures, magnetic susceptibility, sand contents, and water content. On the Ross Sea continental shelf, the core sequences contain two lithologic units, soft diatomaceous mud in the upper and compound glacio-marine sediments in the lower. The lower lithologic unit suggests that ice-sheet-influenced sedimentation existed in glacial times in the Ross Sea. The core sequences on the continental slope and deep-sea basins off the Ross Sea comprise foraminiferal ooze, siliceous mud, and terrigenous mud, sometimes with laminated parts. The laminated parts of the core sequences suggest that strengthened bottom water influenced sedimentation, probably in glacial times. The sedimentary environment in the Late Quaternary is reconstructed based on the core data. (Auth.)

#### E-56523

Tokuhashi, S., Agyingi, C.M., Nishimura, A., **Areal and vertical variation of heavy mineral composition of the surface sediments, Ross Sea, Antarctica**, NIPR Symposium on Antarctic Geosciences, Proceedings. No.9, Tokyo, National Institute of Polar Research, 1996, p.127-140, 18 refs.

Results are presented of heavy-mineral analysis of ice-rafted sand fractions of muddy sediments from several gravity cores collected in the Ross Sea. The samples were collected from two levels of the cores, late Holocene S-group samples, in the upper part, and last glacial to Early Holocene D-group samples, in the lower part of the cores. Both the S-group and D-group show the same kind of heavy minerals and the same distribution pattern of the frequency of those minerals. These patterns suggest the existence of at least two petrographic provinces, the western and the central-eastern areas. It is suggested that the olivine and clinopyroxene with titanite, dominantly distributed in the western area, were probably supplied from the Late Quaternary McMurdo alkaline basaltic volcanics fringing the eastern margin of Victoria Land. The strong similarity of the distribution pattern of heavy mineral composition between the S-group and D-group samples suggests the long-term stability of flow patterns of icebergs in the Ross Sea. (Auth. mod.)

#### E-56524

Jin, Y.K., Kim, Y.D., Kim, H.S., Nam, S.H., **Preliminary results of seismic survey in the central Bransfield Strait, Antarctic Peninsula**, NIPR Symposium on Antarctic Geosciences, Pro-



ceedings. No.9, Tokyo, National Institute of Polar Research, 1996, p.141-149, 12 refs.

Multichannel seismic profiles in the central Bransfield Strait show structural variation mainly controlled by transform faults across the strait. Near King George I., large displacement of the spreading axis, discontinuity and different style of the faults, intense deformation of the basement, and abrupt change in the morphology of the basin are indicative of the presence of a large fault zone. On the basis of the fault map, the central Bransfield Strait can be divided into three segments. Transform faults, including the large fault zone, form the boundaries of segments. The basinward-dipping reflectors concentrated in the central segment suggest that initial rifting activity was relatively strong in this region. (Auth.)

#### E-56542

Ravindra, R., Dey, A., D'Souza, M.J., Beg, M.J., Kaul, M.K., **On the gneisses and associate rocks from south Humboldt Mountains, central Dronning Maud Land, East Antarctica**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.133-159, Refs. p.158-159.

Southern Humboldt Mountains expose polydeformed, high grade granulite facies rocks. These represent essentially pelitic granulites which are associated with minor calc-silicate gneisses and pyroxene granulites. Quartzofeldspathic granitic gneisses are exposed in southern Eidsbotnen area. Geochemical parameters reaffirm a sedimentary parentage for the former and an igneous source for the latter. Dolerite and a late phase pegmatite system intrude these gneisses. The comparison of litho-assemblages of the present area with that of adjoining areas of western Queen Maud Land and Sør Rondane Mountains in the eastern parts suggests their middle Proterozoic affinity with 1000 Ma event of granulite facies metamorphism. (Auth.)

#### E-56543

D'Souza, M.J., Beg, M.J., Ravindra, R., Chaturvedi, A., **Occurrence of alkaline lamprophyre dyke from Schirmacher Range, Dronning Maud Land, East Antarctica**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.161-172, 18 refs.

Alkaline basic dyke with low  $K_2O/Na_2O$  ratio ( $<1$ ), poor  $TiO_2$ , high  $CO_2$  and  $H_2O$  content, dominant carbonate phase and absence of feldspar phenocrysts corresponding to monchiquite variety of alkaline lamprophyre is being reported from the Schirmacher Hills of central Queen Maud Land. Zoned clinopyroxene (augite, diopside), zeolite, altered plagioclase, biotite, nepheline and glass constitute the dyke which has associated marginal brecciation along with xenoliths of country rocks. (Auth.)

#### E-56544

Sengupta, S., **Microstructural variation in mylonites of the Schirmacher Hills, East Antarctica**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.173-187, 15 refs.

Development of ductile shear zone in the Schirmacher Hills took place under amphibolite facies conditions. The microstructures of the sheared quartzofeldspathic rocks differ in many respects with the common mylonites of the green schist facies. The antarctic mylonites show characteristic features typical of high temperature mylonitization. Feldspar has undergone a drastic grain refinement through crystal plastic processes and quartz shows long single-grain or polycrystalline ribbons even in a very advanced stage of mylonitization. The absence of significant optical strain in quartz ribbons is explained by syntectonic grain growth. (Auth.)

#### E-56545

Chawla, A.S., Kak, S.N., Kaul, R., **Radio geochemical mapping of Schirmacher Range central Dronning Maud Land, East Antarctica**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India,

Department of Ocean Development, 1994, p.189-194, 9 refs.

The Schirmacher Hills were systematically studied for geological and radiometric information. Total radioactivity, eU, eTh and K abundances were measured using calibrated portable gamma-ray spectrometer. Computer processed thematic contour maps for total radioactivity, radioelements and their ratios were generated. These have enabled precise delineation of litho-geochemical variations and structural trends with diagnostic radiometric signatures. The studies highlight the efficacy of gamma-ray spectrometric data for geochemical mapping and their use for regional geological studies. The study has suggested that application of the technique, preferably on aerial platform, can be time effective for coverage of large areas at reconnaissance level in logistically difficult terrains, such as that of Antarctica. (Auth.)

#### E-56546

Pathak, R.C., **Geotechnical appreciation of soil and rocks of Schirmacher Hills, East Antarctica**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.195-207, Refs. p.206-207.

The Indian permanent station, Maitri, was constructed during the Seventh (1987-88) and Eighth (1988-89) Indian Antarctica Expeditions. A concerted effort towards geotechnical appreciation of the area was made during the 9th expedition, by evaluating the physical and strength properties of soil and rocks around the station. These geotechnical parameters are important in so far as the foundation, water management and waste disposal systems are concerned. (Auth.)

#### E-56548

Pant, N.C., Ravindra, R., D'Souza, M.J., **Terminal moraines in Grautfatet, Humboldt Mountain, East Antarctica - Indicators of rate of glacier recession**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.219-225, 10 refs.

The Schüssel Cirque is a vast, morainal flat within the Humboldt Mountains. The Somovken glacier branching into the Cirque and Humboldt glaciers has controlled the deposition of terminal moraines in this flat. The disposition of the two sets of terminal moraines, along with the relief pattern of the surrounding ridges have been used to decipher an ice level lowering of 350 to 400 m and a retreat of Somovken glacier by 7.5 km since the last peak ice condition. This recession, in conjunction with the inferred age of last peak ice condition, indicates an average retreat rate of 75/m/100 y for Somovken glacier. (Auth.)

#### E-56567

Molzahn, M., Reisberg, L., Wörner, G., **Os, Sr, Nd, Pb, O isotope and trace element data from the Ferrar flood basalts, Antarctica: evidence for an enriched subcontinental lithospheric source**, *Earth and planetary science letters*, Nov. 1996, 144(3-4), p.529-545, 64 refs.

Os, Sr, Nd, Pb and O isotopes and trace element data are reported for basaltic andesite and andesite whole rocks and, in part, for selected mineral separates from the Jurassic Ferrar flood basalt province, Antarctica. Radiogenic and unradiogenic isotopes are found for all rocks including the most primitive sample. This indicates involvement of either continental crust or enriched lithospheric mantle in magma genesis. Antarctic continental flooding processes, combined with continuous replenishment of picritic magmas, can explain the isotopic data, provided the crustal end-member has high  $^{87}Sr/^{86}Sr$  and low  $\delta^{18}O$  values. However, lower crustal samples displaying these characteristics are absent in the Ferrar region, and are also unlikely to impart the sediment-like trace element patterns observed in the Ferrar data. A more likely explanation is a lithospheric source enriched by subducted sediments. A contribution to Ferrar magmatism from a plume cannot be distinguished. (Auth. mod.)

#### E-56570

Caulkett, A.P., Ellis-Evans, J.C., **Origin and composition of settling iron aggregates in oligotrophic Sombre Lake, Signy Island, Antarctica**, *Hydrobiologia*, Sep. 13, 1996, 330(3), p.177-187, 31 refs.



Sediment traps were deployed in an oligotrophic, seasonally anoxic maritime antarctic lake for 15 months. Immediately after the onset of the inflow in spring iron oxyhydroxide aggregates were collected in the traps. Image analysis, scanning electron microscopy and energy dispersive X-ray analysis were used to examine the aggregates. The aggregates consisted of primary particles that persisted in the aggregates. The concentration of iron, phosphorus and calcium in the aggregates increased with depth, whilst the concentration of manganese decreased with depth in parallel with a gradient of increasing anoxia. The stable water column formed under ice cover and the temporal and spatial data provide evidence that the Fe:P and Fe:Ca ratios are constant and characteristic of the aggregates, whilst the overall composition of the aggregates is more dynamic and dependent on redox conditions and water chemistry. (Auth. mod.)

#### E-56574

Willan, R.C.R., **Moore's Peak formation, a Cretaceous debris-avalanche deposit in the Antarctic Peninsula volcanic group, Livingston Island, South Shetland Islands**, *Journal of South American earth sciences*, May/July 1996, 9(3/4), p.251-264, 53 refs.

New mapping reinterprets the Moore's Peak Formation as a ca. 150 m thick megabreccia unit unconformably overlying the MBF (Miers Bluff Formation), and forming part of the mid- to late Cretaceous APVG (Antarctic Volcanic Group). The megabreccia consists of sheared angular clasts and large blocks of lithified, deformed and hydrothermally altered sandstone, distal turbidite, mudstone and conglomerate and volcanic breccia and tuff and lava clasts, supported in a matrix of pulverized sedimentary and volcanic material, with relatively abundant epidote and clinozoisite. Jigsaw-breccias, irregular color domains and intra-block shears indicate that the breccias formed as subaerial debris-avalanches from an area of uplifted pre-volcanic basement (MBF) overlain by volcanic rocks. Hydrothermal alteration contributed to weakening of the uplifted rocks. Collapse of large volcanic edifices results in sudden decompression of underlying basement and contained hydrothermal systems, resulting in solution boiling, hydraulic brecciation, and mineral deposition. The MBF hosts a laterally extensive quartz vein and breccia system 3 km west of Moore's Peak, which may have formed as a result of a stratovolcano collapse event similar to that represented by the Moore's Peak Formation. (Auth. mod.)

#### E-56575

Smellie, J.L., Pallàs, R., Sàbat, F., Zheng, X., **Age and correlation of volcanism in central Livingston Island, South Shetland Islands: K-Ar and geochemical restraints**, *Journal of South American earth sciences*, May/July 1996, 9(3/4), p.265-272, With Spanish summary. 23 refs.

Volcanic sequences in central Livingston I. can be divided into two broad groups. The older group consists of basalt-dacite lavas, clastic rocks and associated hypabyssal intrusions. The lavas are lithologically and compositionally similar to other pre-Pliocene, volcanic arc lavas in the South Shetland Is. The outcrops vary from relatively fresh to indurated and pervasively altered. A Cretaceous eruptive age (possible Late Cretaceous) for the altered outcrops is likely but cannot yet be proven. By contrast, the younger group consists of degraded basalt lava flows, tuff cone and tuff ring remnants, which are part of the Inott Point Formation. The lavas are very fresh and Pleistocene or Recent in age. They are compositionally distinctive and are indistinguishable from supra-subduction alkali basalts preserved elsewhere in Livingston, Greenwich and Penguin islands. (Auth. mod.)

#### E-56576

Solow, A.R., **Tests and confidence intervals for a common upper endpoint in fossil taxa**, *Paleobiology*, Summer 1996, 22(3), p.406-410, 13 refs.

Statistical inference about the upper and lower endpoints of the stratigraphic ranges of fossil taxa can be based on the pattern of finds. Strauss and Sadler (1989) described a test and confidence interval for a common upper or lower endpoint in two or more taxa. This approach is conservative, in the sense that it provides only an upper bound on the sig-

nificance level. This paper describes and illustrates a test and confidence interval for which the significance level is known, using data from Seymour I. (Auth. mod.)

#### E-56583

Krot, A.N., Scott, E.R.D., Zolensky, M.E., **Origin of fayalitic olivine rims and lath-shaped matrix olivine in the CV3 chondrite Allende and its dark inclusions**, *Meteoritics & planetary science*, Jan. 1997, 32(1), p.31-49, Refs. p.48-49.

Allende meteoritic dark inclusion from Antarctica has been studied by optical microscopy, scanning electron microscopy, electron microprobe analysis and transmission electron microscopy. The inclusion consists of chondrules, isolated olivines and matrix, which, as in the Allende host, is mainly composed of 5-20 µm long lath-shaped fayalitic grains with a narrow compositional range and nepheline. The authors infer that fayalitic olivine rims and lath-shaped fayalites in Allende and its dark inclusions formed from phyllosilicate intermediate phases. This explanation accounts for (1) the similarity of the replacement textures observed in the dark inclusion and Allende host to aqueous alteration textures in Cm chondrites; (2) the anomalously high abundances of Al and Cr and the presence of tiny inclusions of spinels and sulfides in fayalitic olivines in Allende and Allende dark inclusions; (3) abundant voids and defects in lath-shaped fayalites in the Allende dark inclusion, which may be analogous to those in partly dehydrated phyllosilicates in metamorphosed CM/CI chondrites. They conclude that the matrix and chondrule rims in Allende were largely converted to phyllosilicates and then completely dehydrated. (Auth. mod.)

#### E-56584

Wright, I.P., Yates, P., Hutchison, R., Pillinger, C.T., **Content and stable isotopic composition of carbon in individual micrometeorites from Greenland and Antarctica**, *Meteoritics & planetary science*, Jan. 1997, 32(1), p.79-89, Refs. p.79-89.

The C contents and  $\delta^{13}\text{C}$  values of eleven individual micrometeorites from Greenland and Antarctica have been determined using a combination of stepped combustion and static mass spectrometry. The eleven samples (seven separated from Greenland cryoconite and four from antarctic ice) were each split prior to C determination and a fragment taken for study using analytical electron microscopy. In this way, the chemical compositions were obtained thereby allowing comparison with other investigations. As with previous studies of micrometeorites collected at the Earth's surface, the major difficulty with interpreting the results involves distinguishing indigenous components from terrestrial contaminants. It is possible that the light component is  $\text{C}_8$ , a fine-grained form of presolar diamond which is known to be prevalent in primitive chondritic meteorites. If so, then it is present in the micrometeorites at concentrations of ca. 30-600 ppm (typically 200 ppm), which is a similar level to that in meteorites. (Auth. mod.)

#### E-56585

Goswami, J.N., Sinha, N., Murty, S.V.S., Mohapatra, R.K., Clement, C.J., **Nuclear tracks and light noble gases in Allan Hills 84001: preatmospheric size, fall characteristics, cosmic-ray exposure duration and formation age**, *Meteoritics & planetary science*, Jan. 1997, 32(1), p.91-96, 31 refs.

Cosmic-ray produced nuclear tracks and noble gases have been studied in the martian orthopyroxenite Allan Hills 84001 from antarctic sediments, to delineate its cosmic-ray exposure history, preatmospheric size, and fall characteristics. A K-Ar age of 3.9 Ga, cosmic-ray exposure duration of 16.7 Ma, and a preatmospheric radius of 10 cm have been deduced from the noble gas and track data. The formation age, as well as the cosmic-ray exposure duration, determined in this work are in good agreement with values reported earlier and are distinctly different from other shergottite, nakhlite, and chassignite meteorites analyzed so far. There are signatures in the noble gas data that indicate the possible presence of trapped Ar and Ne of martian atmospheric origin in ALH 84001. (Auth. mod.)

#### E-56587

Jacobs, J., Bauer, W., Spaeth, G., Thomas, R.J., Weber, K., **Lithology and structure of the Grenville-aged ( $\approx 1.1$  Ga) basement of Heimfrontfjella (East Antarctica)**, *Geologische*



*Rundschau*, Dec. 1996, 85(4), p.800-821, 45 refs.

The Heimefrontfjella mountains, western Queen Maud Land (East Antarctica), are dominantly composed of Grenville-aged (ca. 1.1 Ga) rocks, which were reworked during the Pan-African orogeny at ca. 500 Ma. Three discontinuity-bounded Grenville-aged terranes have been recognized namely (from north to south) the Kottas, Sivorg and Vardeklettane terranes. The Terranes contain their own characteristic lithological assemblages, although each is made up of an early supracrustal sequence of metavolcanic and/or metasedimentary gneisses, intruded by various (predominantly granitoid) suites. No older basement upon which the protoliths of these older gneisses were deposited has been recognized. The Heimefrontfjella terranes were juxtaposed and pervasively deformed during a complex and protracted period of E-W collision orogenesis in a transpressive regime at ca. 1.1 Ga. The Pan-African event is manifested as discrete, low- to medium-temperature ductile to brittle shears and numerous K/Ar cooling ages. (Auth. mod.)

#### E-56589

Dragoni, M., Lanza, R., Tallarico, A., **Magnetic anisotropy produced by magma flow: theoretical model and experimental data from Ferrar dolerite sills (Antarctica)**, *Geophysical journal international*, Jan. 1997, 128(1), p.230-240, 34 refs.

Volcanic rocks forming sills, dykes or lava flows may display a magnetic anisotropy derived from the viscous flow during their emplacement. The authors model a sill as a steady-state flow of a Bingham fluid, driven by a pressure gradient in a horizontal conduit. It is shown that the magnetic lineation oscillates in the vertical plane through the magma flow direction, and that the magnetic foliation plane changes periodically from horizontal to vertical. The results are compared with the magnetic fabric of Ferrar dolerite sills (Victoria Land) derived from low-field susceptibility measurements. (Auth. mod.)

#### E-56593

Kaul, M.K., Mukerji, S., Singh, R.K., Srivastava, D., Jayaram, S., **Geological set-up of a part of central Queen Maud Land, East Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.55-97, Refs. p.95-97.

#### DLC G850.I53 I53

During the Fifth Indian Expedition to Antarctica, a part of central Queen Maud Land was mapped geologically on 1:50,000 scale. An account of the geology of the area studied is given in this paper. An attempt has been made to present the results in perspective of the published data on the geology of adjoining regions. The present study has revealed that the high pressure granulite facies attained by the rocks of the area were later superimposed by upper amphibolite facies. The imprint of the latter is recorded in varying degrees from place to place. The anorthosites of the Gruber Mountains are distinct in character compared to the other anorthosite in Antarctica. Geochemical contouring, to ascertain titanium dispersion pattern, has yielded interesting results: lamprophyres are reported for the first time from this region. (Auth. mod.)

#### E-56594

Mukerji, S., Kaul, M.K., Singh, R.K., Srivastava, D., Jayaram, S., **Anorthosites of Gruber Massif, central Queen Maud Land, East Antarctica: an appraisal**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.99-108, 9 refs.

#### DLC G850.I53 I53

Anorthosites of Antarctica are by far the least studied of all the monomineralic rocks on the planet. This paper reports certain characteristic features of the anorthosites of Gruber massif, East Antarctica which have a close resemblance with those of Adirondack Mountains, U.S.A. (Auth.)

#### E-56595

Singh, R.K., Mukerji, S., Jayaram, S., Srivastava, D., Kaul, M.K., **Short account of the basic and ultrabasic rocks occur-**

**ring between Schirmacher Hills and Gruber Massif, central Queen Maud Land, East Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.109-119, 17 refs.

#### DLC G850.I53 I53

The rocks exposed in the Gruber Mountains area of eastern Wohlthat Mountains and in the nunataks, which are exposed between the Schirmacher Hills in the north and the Gruber Mountains in the south, are traversed by various dykes and sills of basic igneous intrusives. These have been identified mainly as dolerites and lamprophyres. In this paper, an account of their petrology and petrochemistry is presented. An isolated occurrence of a pyroxenite, north of the Gruber Mountains, is reported. (Auth.)

#### E-56596

Mukerji, S., Kaul, M.K., Singh, R.K., Srivastava, D., Jayaram, S., **Outline of the geology of the nunataks between eastern Wohlthat Range and Schirmacher Hills, central Queen Maud Land, East Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.121-133, 7 refs.

#### DLC G850.I53 I53

A group of eight nunataks projects out of the polar ice between the Schirmacher Hills in the north and the Gruber Mountains in the south, in central Queen Maud Land. These nunataks were geologically examined and an attempt has been made to compare and correlate some of their geological aspects with those of the Schirmacher Hills, the Gruber Mountains and the Petermann area. (Auth.)

#### E-56597

Kaul, M.K., Chakraborty, S.K., Singh, R.K., Mukerji, S., Srivastava, D., Jayaram, S., **Note on the petrochemical characteristics of a nodular basalt dyke from Schirmacher Hills, East Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.135-144, 16 refs.

#### DLC G850.I53 I53

The basaltic dyke containing nodules, *in situ* occurrence of which was located during the 5th expedition, lies in the central part of the Schirmacher Hills, some samples were studied from a petrochemical point of view and a few interpretations are made. Chemical parameters indicate that the basaltic magma has originated by partial melting at great depth and the magma rose rapidly intruding the country rock. More detailed field and laboratory investigations on this rock will contribute to the knowledge of its origin and evolution. (Auth.)

#### E-56598

Jain, S.C., Dhar, R., Reddy, K.N.S., **Geophysical investigations in Schirmacher landmass**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.145-150.

#### DLC G850.I53 I53

Multifrequency EM, magnetic and radiometric measurements were carried out along 13 traverses in the Schirmacher Hills during the Fifth Indian Expedition to Antarctica. No appreciable EM anomaly was found along all the traverses, which attributed to a very low percentage of sulphide mineralization. Magnetic measurements revealed that various geological formations in the area do not have appreciable susceptibility contrast. Laboratory measurements of susceptibilities of various rock samples from the region also support this view. Four anomalies along traverses 4, 7, 10 and 11 are identified; they are attributed to local tectonic features or dyke intrusions. Gamma ray spectrometry measurements were also carried out; potassium, thorium, uranium and total counts were recorded. No significant anomalies were obtained, indicating the absence of radioactive mineralization in the area. However, analysis of the radiometric data indicate a high potassium count over felspathic gneisses as compared to hornblende/biotite gneisses. (Auth. mod.)



**E-56600**

Mukherjee, C., Seshagiri, K., Ramamurthy, T., **Geotechnical properties of the antarctic rocks**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.157-167, 7 refs.

**DLC G850.I53 I53**

Representative rock samples of the terrain between the Schirmacher Hills and Wohlthat Mountains were subjected to tests for identifying some of their geotechnical properties, on an experimental basis. The tests for petrographic character, physical properties and strength were carried out using standard test procedures. The results obtained are falling within the range of values generally acceptable for such rock types. The data are discussed and presented in tables. (Auth. mod.)

**E-56640**

Rao, P.R., Rao, A.V.R., Rao, G.V.S.P., **Geological, geochemical, geochronological and paleomagnetic studies on the rocks from parts of East Antarctica**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.97-106, 16 refs.

Geological, geochemical, geochronological and palaeomagnetic studies were carried out on some of the rocks from the Schirmacher Ponds and the Petermann Ranges. The gneisses from Schirmacher are divided into three types: garnet-biotite gneiss, augen gneiss and leucogneiss. Preliminary Rb/Sr age data of the garnet biotite gneiss and leucogneiss indicate a Late Proterozoic age. The garnet-biotite gneiss has higher Sr, Ba, V, Cr, Nb, Ta, Ba/Sr and Th/U and lower Rb/St compared to the leucogneiss. The REE patterns exhibit a broad negative Eu anomaly. The granites from the Petermann Ranges show a strong negative Eu anomaly and are rich in Rb, Sr and Ba. Palaeomagnetic studies of amphibolites from the Schirmacher region have indicated either Palaeozoic or Late Precambrian age. (Auth.)

**E-56641**

D'Souza, M.J., Beg, M.J., Ravindra, R., Chaturvedi, A., Kaul, M.K., **Geology of Skeids area, Humboldt Mountains, Wohlthat Range, central Dronning Maud Land, East Antarctica**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.107-136, Refs. p.134-136.

Geologically, the Skeids area is a Proterozoic metamorphic terrain exposing a dominant orthogneissic unit, which has been intruded by two granitic phases, observed as an earlier foliated granite and a later undeformed granite. The orthogneissic unit has been metamorphosed to upper amphibolite facies and has undergone at least three major deformational phases. The foliated granite represents a syntectonic intrusive phase with a foliation plane developed parallel to regional gneissosity  $S_2$ . The occurrence of later undeformed granite conforms to the widely reported alkali granite intrusives from several parts of East Antarctica. (Auth.)

**E-56642**

Srinivas, Y., **Instrumental neutron activation analysis of rock samples from Schirmacher Range, central Dronning Maud Land, East Antarctica**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.137-144, 19 refs.

Non-destructive Instrumental Neutron Activation Analysis (INAA) of rare earth elements, some trace and major elements of the representative rock samples from the Schirmacher Hills comprising 5 gneiss samples (quartz-biotite, garnet-biotite, sheared-banded, leucocratic- and banded gneiss) have been carried out. The samples were irradiated for 8 hours along with standard reference rock samples of suitable weights in a thermal neutron flux of  $\approx 10^{13}$ /n $cm^2$ /sec. The elemental concentrations are estimated by studying the induced activity produced in samples using high resolution gamma ray spectrometry. The results of elemental characterization of 5 different rock types are compared with normal magmatic rock and discussed. (Auth.)

**E-56667**

Steele, W.K., Hiller, A., **Radiocarbon dates of snow petrel (*Pagodroma nivea*) nest sites in central Dronning Maud Land, Antarctica**, *Polar record*, Jan. 1997, 33(184), p.29-38, Refs. p.37-38.

This paper presents the results of a radiocarbon dating study of snow petrel (*Pagodroma nivea*) nest sites in central Queen Maud Land. *Mumiyo* (a sub-fossilized accumulation of regurgitated proventricular oil) samples were collected from 15 snow petrel nest sites at nunataks in the northern Ahlman Ridge, Gjelsvik Mountains and Mühlig-Hofmann Mountains. Radiocarbon dating revealed Holocene ages of ca. 8500 years and less for all but one of these *mumiyo* samples. One sample was dated as old as ca. 34,000 a BP. Similar pre-Holocene ages have been determined for a small number of *mumiyo* samples in previous studies. *Mumiyo* accumulations from some nests indicate periods of occupation as long as 6,000 years, whereas the radiocarbon age and volume of other *mumiyo* samples suggest short periods of frequent nesting activity. Sub-samples extracted from the lower layers of *mumiyo* pieces generally displayed greater ages than sub-samples from upper layers of the same piece. (Auth. mod.)

**E-56683**

**Lake life thrived at the South Pole**, *New scientist*, June 29, 1996, 150(2036), p.15.

The South Pole once boasted a lake teeming with life. This discovery suggests that even inland parts of the antarctic ice sheet could have melted during mild spells in the long ice age that began in the late Carboniferous period. Until now, geologists believed that only the margins of the ice melted. (Auth. mod.)

**E-56693**

Burckle, L.H., **Critical review of the micropaleontological evidence used to infer a major drawdown of the east antarctic ice sheet during the Early Pliocene**, *Paleoclimate and evolution*, with emphasis on human origins, edited by E.S. Vrba, G.H. Denton, T.C. Partridge, and L.H. Burckle, New Haven, CT, Yale University Press, 1995, p.230-241, 54 refs.

**DLC GN281.4.P35 1995**

The author disputes the conclusions of an earlier researcher who claims that in Sirius Group samples, "the microfossil assemblages are dominated by Pliocene [diatom] species." The history of the antarctic cryosphere can be more fully and believably developed by study of deep-sea sediments recovered from the southern ocean and deep cores recovered from the antarctic continent. It is apparent that although there may have been drawdown of the east antarctic ice sheet during the early Pliocene, it was not of the magnitude envisioned by the deglacial hypothesis. In addition, it is very likely that the west antarctic ice sheet and alpine and tidewater glaciers from both hemispheres contributed to the accompanying sea-level rise. This has implications for Early Pliocene climate and paleogeography; a more limited sea-level rise during this time would be less restrictive of faunal and floral migrations across terrestrial choke points, such as the Suez region. Similarly, oceanic choke points such as the seas around the Indonesian archipelago would have been less affected by a more modest sea-level rise, and the Early Pliocene warming is seen as presenting less of a physical impediment to continental faunal and floral migration. (Auth. mod.)

**E-56729**

Grossman, J.N., Score, R., **Meteoritical Bulletin, No. 79, 1996 July: Recently classified specimens in the United States Antarctic Meteorite Collection (1994-1996)**, *Meteoritics & planetary science*, July 1996, 31 Supplement, A161-A174, Reprints requests to: Marilyn Lindstrom, Code SN2, NASA/Johnson Space Center, Houston, Texas 77058, USA.

The Meteoritical Bulletin No.79 contains a list of all meteorites classified between 1994 Mar. and 1996 Feb. by the United States' antarctic meteorite program. The compilation includes available information on classification, mass, weathering, olivine and pyroxene composition,  $^{26}\text{Al}$  activities, natural thermoluminescence levels, pairing, collection location, and references to published descriptions for 1,761 meteorite specimens. A list of the most significant meteorites in the entire ANS-MET collection of 7,298 classified specimens is also included. (Auth.)



**E-56730**

Grossman, J.N., **Meteoritical Bulletin, No. 80, 1996 July, *Meteoritics & planetary science*, July 1996, 31 Supplement, p.A175-A180 (Pertinent p.A175-A176 and p.A179-A180), 12 refs.**

The Meteoritical Bulletin No.80 lists data for 178 meteorites. Noteworthy are 3 HED meteorites (ALH 88102, Hammadah al Hamra (HaH) 059, and Monticello); 3 ureilites (HaH 064, HaH 126, and Dar al Gani (DaG) 084); 4 irons (Baygorria (IAB), Ste. Croix (IIIAB), Sargiin Gobi (IAB), and Tarahumara (IIE)); an unusual metal-rich meteorite (Vermilion); 8 carbonaceous chondrites (HaH 043 (CO3), HaH 073 (C4), DaG 055 (C3) and 5 CO3 chondrites (probably paired) from DaG); an R chondrite (DaG 013); and 6 unequilibrated ordinary chondrites (ALH 88105 (L3), Camel Donga 016 (L3), HaH 093 (LL3.9), HaH 096 (LL(L)3), Richfield (LL3.7), and Sarir Quattusah (LL(L)3)). Three recent falls of ordinary chondrites (Coleman (LL5), St. Robert (H5), and Tsukuba (H5-6)) are described. (Auth.)

**E-56731**

Bischoff, A., **Lunar meteorite Queen Alexandra Range 93069: A lunar highland regolith breccia with very low abundances of mafic components, *Meteoritics & planetary science*, Nov. 1996, 31(6), p.849-855, 34 refs.**

Lunar meteorite QUE 93069 found in Antarctica is a mature, anorthitic regolith breccia with highland affinities that was ejected from the Moon <0.3 Ma ago. The frequency distribution of mineral and lithic clasts gives information about the nature of the regolith and subregolith basement near the ejection site as well as about the abundances of rock types shocked to different degrees prior to the breccia formation. Lunar meteorite QUE 93069 has a higher abundance of clear glass, occurring within melt spherules, glassy fragments, and an impact melt vein than lunar meteorites ALHA81005, Y-791197, Y-82192/3, Y-86032, or MAC 88104/5. The high abundance of melt spherules indicates that this lunar meteorite contains the highest content of typical regolith components. Mafic crystalline melt breccias are much rarer in QUE 93069 than in all other lunar highland regolith breccias. The extremely low abundance of mafic components may constrain possible areas of the Moon, from which the breccia was derived. The source area of QUE 93069 must be a highland terrain lacking significant mafic impact melts or mare components. (Auth. mod.)

**E-56732**

Thalmann, C., et al, **History of lunar meteorites Queen Alexandra Range 93069, Asuka 881757, and Yamato 793169 based on noble gas isotopic abundances, radionuclide concentrations, and chemical composition, *Meteoritics & planetary science*, Nov. 1996, 31(6), p.857-868, 45 refs.**

Based on the solar wind and cosmic-ray irradiations, QUE 93069 is the most mature lunar meteorite studied up to now. The  $^{40}\text{Ar}/^{36}\text{Ar}$  ratio of the trapped component is 1.87, a ratio corresponding to a time when the material was exposed to solar and lunar atmospheric volatiles  $\approx 400$  Ma ago. Yamato 793169 and Asuka 881757 contain very little or no solar noble gases, which indicates that these materials resided in the top layer of the lunar regolith only briefly or not at all. For all lunar meteorites, a positive correlation of the concentrations of cosmic-ray produced with trapped solar noble gases is observed. The duration of lunar regolith residence for the lunar meteorites was calculated and appropriate production rates were derived. The exposure history of QUE 93069 after ejection from the Moon was derived from the radionuclide concentrations: ejection 0.16 Ma ago, duration of Moon-Earth transit 0.15 Ma and fall on Earth <0.015 Ma ago. This ejection event is distinguished temporally from those which produced the other lunar meteorites. The authors conclude that six to eight events are necessary to eject all the known lunar meteorites. (Auth. mod.)

**E-56733**

Benoit, P.H., Sears, D.W.G., Symes, S.J.K., **Thermal and radiation exposure history of lunar meteorites, *Meteoritics & planetary science*, Nov. 1996, 31(6), p.869-875, 44 refs.**

The natural and induced thermoluminescence (TL) of seven lunar meteorites has been measured in order to examine their crystallization, irradiation, and recent thermal histories. Lunar meteorites have induced

TL properties similar to Apollo samples of the same provenance (highland or mare), indicating similar crystallization and metamorphic histories. MacAlpine Hills 88104/5 has experienced the greatest degree of impact/regolith processing among the highland-dominated meteorites. The basaltic breccia QUE 94281 is dominated by mare component but may also contain a significant highland component. For the mare-dominated meteorites, EET 87521 may have a significant highland impact-melt component, while Asuka 881757 and Y-793169 have been heavily shocked. The thermal history of Y-793169 included slow cooling, either during impact processing or during its initial crystallization. The natural TL data indicate that most lunar meteorites have apparently been irradiated in space a few thousand years, with most <15,000 a. Elephant Moraine 87521 has the lowest irradiation exposure time, being <1,000 a. Either the natural TL of ALHA81005, Asuka 881757 and Y-82192 was only partially reset by lunar ejection or these meteorites were in small perihelia orbits ( $\leq 0.7$  AU). (Auth.)

**E-56734**

Arai, T., Takeda, H., Warren, P.H., **Four lunar mare meteorites: crystallization trends of pyroxenes and spinels, *Meteoritics & planetary science*, Nov. 1996, 31(6), p.877-892, 73 refs.**

The authors studied crystallization trends of pyroxene and spinel in four antarctic meteorites known to be derived from mare regions of the Moon: Y-793169 and A-881757 (YA meteorites) are unbrecciated igneous basalts, EET 87521 is a fragmental breccia, and Y-793274 is a regolith breccia. All have relatively low bulk-rock  $\text{TiO}_2$  content, and the YA meteorites are uncommonly ancient. The electron probe microanalysis (EPMA) data indicate that the YA meteorites and the dominant mare components of Y-793274 and EET 87521 conform to a general trend for Ti-poor (low-Ti and very low-Ti) mare basalts. Their pyroxenes show a strong correlation between  $\text{Fe}/(\text{Fe} + \text{Mg})$  (Fe#) and  $\text{Ti}/(\text{Ti} + \text{Cr})$  (Ti#), both ratios typically increasing from core to rim. These trends presumably reflect local crystallization differentiation of interstitial melt. Previous studies have suggested that the detailed configurations of such Fe# vs. Ti# trends may reflect the bulk  $\text{TiO}_2$  contents of the parent magmas (basalts). The present study seeks a more systematic approach to this problem: the bulk-rock  $\text{TiO}_2$  is plotted as a function of the  $\text{Fe}\# = 0.50$  intercept of each rock's pyroxene Fe# vs. Ti# trend. This intercept is called the Fe#-normalized Ti#. (Auth. mod.)

**E-56736**

Koeberl, C., Kurat, G., Brandstätter, F., **Mineralogy and geochemistry of lunar meteorite Queen Alexandra Range 93069, *Meteoritics & planetary science*, Nov. 1996, 31(6), p.897-908, 47 refs.**

Queen Alexandra Range (QUE) 93069 is a glass-rich regolith breccia derived from the lunar highlands. The high abundance of glassy fragments, the presence of agglutinates, the small size of all mineral and glass fragments, the presence of mostly melt rocks, and the low abundance of pristine lunar crustal rocks, all indicate that QUE 93069 is derived from a mature regolith. This conclusion is also supported by its high siderophile element content. The most common mafic mineral is pyroxene, with compositions that indicate derivation from ferroan ANT suite rocks. Rare gabbro differentiation products may be indicated by the presence of silica, fayalitic olivine, and one pyroxferroite grain. Lithic fragments are mostly meta-melt rocks of ANT composition. The glass compositions are dominated by troctolitic anorthosite compositions, followed by gabbroic anorthosite and noritic anorthosite. Most glasses are ol-normative in composition. Some rare basic glasses of noritic composition were observed. Glass fragments and matrix glasses are alkali-poor, except for some rare alkali-rich shards. The bulk chemical composition of QUE 93069, as well as the rare-earth-element (REE) abundance pattern, is very similar to that of other highlands meteorites, such as MAC 88105 and Y-86032 and to average lunar highlands crust. (Auth. mod.)

**E-56737**

Korotev, R.L., Jolliff, B.L., Rockow, K.M., **Lunar meteorite Queen Alexandra Range 93069 and the iron concentration of the lunar highlands surface, *Meteoritics & planetary science*, Nov. 1996, 31(6), p.909-924, 71 refs.**



Based on electron microprobe analyses of the fusion crust, glassy matrix, and clasts, and instrumental neutron activation analysis of breccia fragments, QUE 93069 is dominated by nonmare components of ferroan, noritic-anorthosite bulk composition. Thin section QUE 93069,31 also contains a large, impact-melted, partially devitrified clast of magnesian, anorthositic-norite composition. The enrichment in Fe, Sc, and Cr and lower Mg/Fe ratio of lunar meteorites Yamato 791197 and Yamato 82192/3 compared to other feldspathic lunar meteorites can be attributed to a small proportion (5-10%) of low-Ti mare basalt. It is likely that the nonmare components of Yamato 82192/3 are similar to and occur in similar abundance to those of Yamato 86032, with which it is paired. There is a significant difference between the average FeO concentration of the lunar highlands surface as inferred from the feldspathic lunar meteorites (mean: ca. 5.0%; range: 4.3-6.1%) and a recent estimate based on data from the Clementine mission (3.6%). (Auth. mod.)

#### E-56754

Dietrich, P.G., **Recent sediments and nutrient fluxes at the sediment-water interface off the Elephant Island (South Shetlands)**, *Zeitschrift für Geologische Wissenschaften*, Nov. 1990, 18(11), p.997-1009, With German and Russian summaries. Refs. p.1007-1009.

#### DLC QE1.Z395 1990

Investigations of surficial sediments (0-20 cm) and their pore waters from 9 bottom grab stations, from water depths of 40 to 4190 m off Elephant I., were carried out to characterize the sediments and to estimate the contents of nutrients in pore waters and their fluxes at the sediment/water interface. Contents and fluxes of nutrients were greater in reduced sediments (Eh <200 mV) than in weakly reduced (Eh >200 mV). Values for comparison from Admiralty Bay were in the same range, but 2 times higher in phosphate, presumably as a result of nearby penguin colonies. Investigations of organics on and in the surface sediments (biomass, structure of the benthos, lipids, albumens) show that the influence of animals is high and variable, but does not essentially affect the gradients of pore water nutrients in this region. (Auth. mod.)

#### E-56755

Stackebrandt, W., **Gondwana reconstruction; the fit between South India and East Antarctica**, *Zeitschrift für Geologische Wissenschaften*, Dec. 1990, 18(12), p.1061-1065, With German and Russian summaries. 12 refs.

#### DLC QE1.Z395 1990

In this paper some geologic indications are given for the fitting of southern India to central Queen Maud Land. In this respect, the NW-SE trending Kerala Khondalite Belt is found to be of outstanding interest. Based on similarities of the rock sequences, this South Indian mobile belt can be traced from Kerala, possibly traversing the southern part of Sri Lanka, to central Queen Maud Land in Antarctica. The correlative geologic history of the Indian and antarctic part of this khondalite belt (succession of deformational, metamorphic and intrusive events) supports this correlation. The best fitting results from a pre-drift position of the southern tip of India (Cap Comorin) to about 35°E near the Antarctic Circle (NE of the Princess Astrid Coast). (Auth.)

#### E-56759

DiVenere, V.J., **Paleomagnetic results from Marie Byrd Land, West Antarctica: tectonic implications for West Antarctica and the Atlantic-Pacific plate circuit**, New York, Columbia University, 1995, 211p., University Microfilms order No. 95-22848, Ph.D. thesis. Refs. p.196-202.

Marie Byrd Land (MBL) is the tectonic keystone of West Antarctica because it is the crucial link between West Antarctica, East Antarctica and the Atlantic plates, and New Zealand and the Pacific plate. The South Pacific Rim International Tectonics Expedition (SPRITE) visited MBL during the 1990-93 austral summer field seasons. In addition to descriptions of field relations and sampling for geochemical and radiometric analyses, a total of 987 oriented cores and 66 oriented hand samples were collected at 174 sites for paleomagnetic analysis from units ranging in age from Cambrian through Tertiary. Paleomagnetic results from Early Cretaceous (ca. 117 Ma) units of the Ruppert/Hobbs Coast of MBL and a reassessment of the earliest Jurassic pole from New Zealand are presented. Results from mid-Cretaceous (ca. 100 Ma) units yield a

mean pole that groups well with like age results from Thurston I. and the Antarctic Peninsula. It is concluded that there has been paleomagnetically resolvable displacement of the Pacific-bordering blocks of West Antarctica with respect to East Antarctica since about 100 Ma as a result of extension in the Ross Sea, Ross Embayment, and Byrd Subglacial Basin. (Auth. mod.)

#### E-56761

Carson, C.J., Powell, R., Wilson, C.J.L., Dirks, P.H.G.M., **Partial melting during tectonic exhumation of a granulite terrane: an example from the Larsemann Hills, East Antarctica**, *Journal of metamorphic geology*, Jan. 1997, 15(1), p.105-126, Refs. p.124-126.

Anatectic migmatites in medium- to low-pressure granulite facies metasediments exposed in the Larsemann Hills contain leucosomes with abundant quartz and plagioclase. Leucosome development and terrane decompression proceeded during crustal transpression, synchronous with upper crustal extension, during a progressive Early Palaeozoic collisional event. Subsequent retrograde evolution was characterized by cooling, as indicated by the growth of biotite replacing spinel and garnet, thin mantles of cordierite replacing spinel and quartz within metapelites, and garnet replacing orthopyroxene and hornblende within metabasites. (Auth. mod.)

#### E-56764

White, R.W., Clarke, G.L., **Timing of Proterozoic deformation and magmatism in a tectonically reworked orogen, Rayner Complex, Colbeck Archipelago, East Antarctica**, *Precambrian research*, 1993, Vol.63, p.1-26, 41 refs.

The high-grade metamorphic rocks of the Colbeck Archipelago comprise granulite facies metasedimentary gneisses and charnockitic gneisses of three ages. A suite of rocks previously mapped as the Colbeck Gneiss is shown to be composite in age and origin, consisting of metasedimentary and orthogneiss that are intruded by granitic gneiss and charnockitic gneiss. An (?) Archaean granulite facies  $S_1$  gneissosity is preserved in the metasedimentary gneisses and early orthogneiss; the development of  $S_1$  was followed by isobaric cooling from peak metamorphic conditions of  $T \geq 750^\circ\text{C}$  and  $P = 5.1$  kbar. Younger intrusions cut rocks containing  $S_1$  structures, but were deformed by an approx. 1200 Ma granulite facies  $D_2$  event that resulted in reclined, isoclinal  $F_2$  folds oriented parallel to a pervasive east-trending  $L_2$  mineral and stretching lineation. Rocks bearing  $S_2$  structures are cut by the areally extensive ca. 960 Ma Mawson Charnockite, which was affected by two upright folding events  $D_3$  and  $D_4$  at ca. 920 Ma. Events  $D_{2-4}$  comprise the Proterozoic Rayner Structural Episode, which is characterized regionally by the retrogression of Archaean assemblages. The two pulses of extensive intermediate to felsic magmatism accompanied or immediately preceded the Proterozoic orogenies evident as  $D_{2-4}$ . The formation of extensional, granulite facies  $D_5$  ultramylonite  $\pm$  pseudotachylite zones is the last deformation event in the area. (Auth. mod.)

#### E-56765

Sengupta, S., **Tectonothermal history recorded in mafic dykes and enclaves of gneissic basement in the Schirmacher Hills, East Antarctica**, *Precambrian research*, 1993, Vol.63, p.273-291, 37 refs.

There are successive generations of mafic dykes and other mafic and ultramafic bodies within the gneissic rocks of the Schirmacher Hills. Three major groups of events can be recognized by comparison of their internal structures with those of their charnockitic or granitic host, and by identification of their successive stages of transformation by metamorphism and migmatization. These events are: (1) granulite facies metamorphism ( $M_1$ ) syntectonic with  $D_1$ ; (2) a second phase of granulite facies metamorphism ( $M_2$ ) and associated charnockitization syntectonic with transposition of  $D_1$  foliation by isoclinal folding during  $D_2$ ; and (3) emplacements of granites and pegmatites associated with amphibolite facies metamorphism ( $M_3$ ), broadly syntectonic with two generations of isoclinal folding ( $D_3$ ). The oldest mafic and ultramafic rocks occur as isolated enclaves and preserve a discordant  $D_1$  foliation marked by metamorphic minerals characteristic of the first granulite facies metamorphism. Mafic bodies that postdate  $M_1$  occur as dykes that were emplaced



either: (1) syn  $M_2$ , (2) syn  $M_3$ , or (3) post  $M_3$ . It is suggested that  $M_1$ ,  $M_2$  and  $M_3$  took place towards the end of the Neo, Meso- and Palaeoproterozoic, respectively. (Auth.)

#### E-56768

Chapman, J.L., **Distinguishing internal developmental characteristics from external palaeoenvironmental effects in fossil wood**, *Review of palaeobotany and palynology*, Mar. 1994, 81(1), p.19-32, 33 refs.

DLC QE993.R4 1994

Fossil wood has the potential to record several aspects of the palaeoenvironment in which it grew. Ring width (especially cell number), latewood format, falserings and traumatic tissue are all important morphological characters. Other characters, such as ray dimensions, bark thickness and tracheid or vessel size, are also probably useful but as yet not fully understood. Unfortunately, all these characters vary within a tree depending on position of the wood: twig, branch, trunk, stump or root. It is thus important that the growing position of fossil fragments is identified so that comparisons of wood characters between sites can be made. Fossil examples of characters from woods from the Cretaceous of Antarctica and Alaska provide examples of palaeoenvironmental interpretation. (Auth.)

#### E-56784

Hill, R.S., Harwood, D.M., Webb, P.N., **Nothofagus beardmorensis (Nothofagaceae), a new species based on leaves from the Pliocene Sirius Group, Transantarctic Mountains, Antarctica**, *Review of palaeobotany and palynology*, Nov. 1996, 94(1-2), p.11-24, Refs. p.23-24.

Leaves from the Late Pliocene Sirius Group at Oliver Bluffs in the Dominion Range are assigned to the new species *Nothofagus beardmorensis* Hill, Harwood et Webb, n.sp. The plant which produced the leaves was winter deciduous, and it is probable that the wood and pollen of *Nothofagus* that co-occur in the sediments are conspecific with *N. beardmorensis*. The presence of this species in Antarctica in the Pliocene suggests a much different climate than at present, since no extant *Nothofagus* species can survive temperatures below about  $-22^{\circ}\text{C}$  in winter, and temperatures must have been substantially above  $0^{\circ}\text{C}$  for a relatively long period during the growing season for the growth and reproductive effort observed. A preliminary estimate of a  $13-15^{\circ}\text{C}$  temperature difference between fossil deposition and the present day is inferred. (Auth.)

#### E-56791

Cúneo, N.R., **Permian phytogeography in Gondwana**, *Palaeogeography, palaeoclimatology, palaeoecology*, Oct. 1996, 125(1-4), p.75-104, Refs. p.101-104.

Phytogeographic patterns based on multivariate techniques (Multidimensional Scaling) are proposed for the Permian vegetation of Gondwana. This approach requires a data set with broad geographic coverage based on generic composition and with good time control. In general, strong phytogeographic differentiation can be observed throughout the Permian. In order to identify short term phytogeographic patterns, the Permian period was informally divided into five time slices. Latitudinal differentiation can be observed, with Antarctica as a polar unit, Afro-Australia at high latitudes, whereas the South American-Indian and Patagonian Units are located in mid-latitudes. It is concluded that this kind of phytogeographic approach has proven useful for detecting some palaeogeographic problems, such as those involving the Patagonian subcontinent. In this regard, palaeogeographic reconstructions and palaeoclimatic models should be tested against these phytogeographic patterns. (Auth. mod.)

#### E-56792

Isbell, J.L., Cúneo, N.R., **Depositional framework of Permian coal-bearing strata, southern Victoria Land, Antarctica**, *Palaeogeography, palaeoclimatology, palaeoecology*, Oct. 1996, 125(1-4), p.217-238, Refs. p.236-238.

The Permian Weller Coal Measures of Antarctica are exposed in a narrow belt that extends along the edge of the Polar Plateau from the Mawson Glacier to the Mulock Glacier in southern Victoria Land. These rocks record a rapid change from glacial to postglacial conditions, with

the establishment of polar peat forming conditions, during the Late Paleozoic in Antarctica. Establishment of vegetation in southern Victoria Land occurred immediately following Late Paleozoic deglaciation. Upward in the Weller, the distribution of plant fossils and coal seams is lithofacies dependent. Thick coals and abundant plant fossils occur in meandering stream lithofacies, while they are scarce within the lacustrine and braided stream deposits. Depositional patterns within the Weller Coal Measures are similar to those in the Takrouna Formation in northern Victoria Land. Similarities suggest deposition in either the same or a similar basin. Comparison of the Weller Coal Measures with Permian strata in the central Transantarctic Mountains suggest deposition in two separate basins, which are now juxtaposed across the Byrd Glacier, the sight of a possible Cenozoic strike-slip fault. (Auth. mod.)

#### E-56815

Cevolani, G., Martignago, F., Molin, G., Trivellone, G., **Antarctic large micrometeorites: state-of-art and preliminary results**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.253-266, 24 refs.

In a preliminary test study, wind-blown antarctic gross-particles (up to 300-400 micron) have been trapped during Dec. 1994-Jan. 1995 in collectors inside meteorological containers and aerosol samplers at Campo Icaro, near Terra Nova Bay Station. Mineralogical analysis shows that the large micrometeorites are conspicuously rare and the collected particles are constituted by single crystal fragments of feldspars, quartz, biotite and amphibole as observed in order of abundance. A mechanism of concentration of cosmic dust, in polar regions, by sedimentation processes occurring in seasonal meltwater lakes on glaciers close to coastal regions, is thought to be a decisively more efficient mechanism than the eolian transport of these large micrometeorites. (Auth. mod.)

#### E-56832

Johnson, A.C., **Arc evolution: a magnetic perspective from the Antarctic Peninsula**, *Geological magazine*, Nov. 1996, 133(6), p.637-644, Refs. p.642-644.

The Antarctic Peninsula is a Mesozoic-Cenozoic magmatic arc built on Palaeozoic and younger basement. It was formed by processes related to the subduction of Pacific ocean floor at its western margin, although subduction has now ceased along most of its length. The peninsula features all the tectonic components commonly associated with a developing arc system: basement, accretionary complex, magmatic arc, arc-related basins, intra-arc extension and post-subduction volcanism. High resolution aeromagnetic data have recently been collected in a transect across part of the arc, covering an area 290 by 230 km and incorporating examples of most of the above tectonic components. The new map reveals distinct magnetic signatures, which can now be related to each of these components in a way that was not possible with reconnaissance data sets. A characteristic magnetic anomaly pattern for each component is described and comparisons drawn with magnetic studies of other arc regions. (Auth.)

#### E-56848

Jayatilleke, S., Matsueda, H., **Comparison of the mineralogy of Sri Lanka and a part of East Antarctica**, *National Science Council of Sri Lanka. Journal*, Dec. 1992, 20(2), p.271-299, Refs. p.297-299.

DLC Q4.N145a 1992

This paper presents the mineralogical data from marble and skarns of Sri Lanka and compares them with those of Lützow-Holm Bay and Prince Olav Coast. Impure marble and skarn deposits in this part of East Antarctica and Sri Lanka contain abundant phlogopite, forsterite, apatite, and spinel. Calcite-dolomite exsolution texture is clearly displayed in all samples and the equilibrium temperatures for exolutions have been estimated. Some of the spinels, both in Sri Lanka and East Antarctica, are zincian. Uvite (Ca-tourmaline), which is rare in nature, has been reported from both Sri Lanka and East Antarctica. Beryl and alkali feldspar occur in pegmatites both in Sri Lanka and East Antarctica. Mineralogical and geological features observed by the present authors and earlier workers in Sri Lanka match those of Lützow-Holm Bay and



Prince Olav Coast. These findings support the juxtaposition of the above mentioned regions as part of a Gondwanaland paleo continent reconstruction. (Auth. mod.)

#### E-56852

Savini, R., Abreu, V., **Calcium carbonate and foraminifer distribution in the Bransfield Strait** [Influência da zona de compensação do carbonato de cálcio na distribuição dos foraminíferos no Estreito de Bransfield, Península Antártica], *Sociedade Brasileira de Paleontologia*, 1989, Vol.1, Anais do XI Congresso Brasileiro de Paleontologia, Curitiba-PR, 1 a 7 de Setembro, 1989 (Brazilian Paleontology Convention, 11th, Curitiba-PR, Sep. 1-7, 1989. Proceedings), p.779-796, In Portuguese with English summary. Refs. p.784-785.

**DLC QE752.B8C66 1989**

An important factor affecting the distribution of foraminifers in the Antarctic is the dissolution rate of the calcium carbonate. In the Bransfield Strait, the compensation zone of calcium carbonate is present at depths of about 500 m. The foraminiferal distribution in the Strait appears to be highly influenced by the dissolution boundary, considering that the samples were recovered from depths greater than 1,900 m. The foraminiferal population was composed largely of noncalcareous agglutinated benthonics. The only planktonic foraminifer present in the area was *Neoglobobadrina pachyderma*, indicating the strong influence of the lysocline. This study is based on 5 gravity cores and 7 bottom samples collected by the German oceanographic vessel *Polarstern*. The foraminifers occur along with abundant diatoms, radiolarians and sponge spicules in volcanic sediments. (Auth. mod.)

#### E-56853

Osanai, Y., et al, **Explanatory text of geological map of Brattnipene, Sør Rondane Mountains, Antarctica, Tokyo. National Institute of Polar Research. Antarctic geological map series**, Mar. 1996, Sheet 34, 29p. + 7 plates + map, Refs. p.25-29.

A geological map of the Brattnipene Peaks is presented on a 1:100,000 scale, with location diagrams and legend for stratigraphic and geomorphological data. The general geology of the area, geochemistry and mineralogy of the rocks, geochronology, geologic structure and tectonic evolution are discussed in the accompanying text. Tabulated data are included.

#### E-56856

Matsuoka, N., Moriwaki, K., Hirakawa, K., **Field experiments on physical weathering and wind erosion in an Antarctic cold desert**, *Earth surface processes and landforms*, Aug. 1996, 21(8), p.687-699, Refs. p.698-699.

Field experiments were carried out over a 5 year period on contemporary weathering and erosional environments in the Sør Rondane Mountains, including observations of scaling from rockwalls, disintegration of tuff blocks, and abrasion of artificial walls by wind. Monitoring was also made of rock surface temperature and wind speed. Rock scaling due to frost action was generally very slow because of low moisture content in the rock-walls. Exposure to the cold, dry climate led to the rapid disintegration of porous tuff blocks including soluble salts like halite and thenardite. This indicates that rates of weathering are increased greatly with the accumulation of salts in the bedrock. Increasing gypsum contents may also intensify rock breakdown. The snow-laden katabatic wind resulted in rapid wearing of the windward face of an asbestos board with the peak erosion at 30-40 cm above the ground. These experiments suggest that frost weathering and wind erosion are only locally effective where plenty of moisture or an abrasive material is available, whilst salt weathering and removal of the waste by wind play a major role in constructing erosional landforms over the mountains. (Auth. mod.)

#### E-56861

Wand, U., Schwarz, G., Brüggemann, E., Bräuer, K., **Evidence for physical and chemical stratification in Lake Untersee (central Dronning Maud Land, East Antarctica)**, *Antarctic science*, Mar. 1997, 9(1), p.43-45, 12 refs.

Lake Unter-See is the largest freshwater lake in the interior of East Antarctica. It is a perennially ice-covered, max. 169 m deep, ultra-oligotrophic lake. In contrast to earlier studies, the authors found clear evidence for physical and chemical stratification in the summer of 1991-92. The stratification was restricted to a trough, c. 500 m wide and up to 105 m deep, in the south-western part of the lake. There, the water body was distinctly stratified as indicated by sharp vertical gradients of temperature, pH, dissolved oxygen, and electrical conductivity. The water column was anoxic below 80 m. The chemical stratification is also indicated by changes of ionic ratios. Moreover, there was some evidence for methanogenesis and bacterial sulphate reduction in Lake Unter-See. (Auth.)

#### E-56865

Harley, S.L., Black, L.P., **Revised Archaean chronology for the Napier Complex, Enderby Land, from SHRIMP ion-microprobe studies**, *Antarctic science*, Mar. 1997, 9(1), p.74-91, Refs. p.89-91.

The long and complex Archaean evolution of the Napier Complex of Enderby Land, characterized by high-grade metamorphism and several strong deformations, is reassessed in the light of new SHRIMP-Pb zircon dating results bearing on the ages of protoliths and possible regional extents of distinct Archaean tectonothermal events. Initial felsic igneous activity occurred over a significant time interval ca. 3800 Ma ago. An age of 2980±9 Ma for the emplacement of charnockite at Proclamation I. might date the oldest tectonothermal event to be recognized in the Napier Complex. An ensuing, very-high grade, previously imprecisely dated tectonothermal event occurred at 2837±15 Ma. U-Pb zircon ages, ranging from 2456±8/-5 Ma to 2481±4 Ma date a subsequent, protracted high-grade tectonothermal event. Whereas the ca. 2840 Ma event is of regional importance in the Amundsen-Bay-Casey Bay area, it is possible that the ca. 2980 Ma event was of only moderate grade, minor importance, or even absent, in that part of the Complex. If so, the apparent trend to very-high temperature metamorphism in the Tula and Scott mountains compared with the Napier Mountains may reflect two distinct metamorphic events rather than a simple baric and thermal gradient. The oldest crustal component in the Napier Complex appears to have been of igneous derivation. (Auth. mod.)

#### E-56866

Marion, G.M., **Theoretical evaluation of mineral stability in Don Juan Pond, Wright Valley, Victoria Land, Antarctica**, *Antarctic science*, Mar. 1997, 9(1), p.92-99, 29 refs.

Don Juan Pond is the most saline of the antarctic lakes, being a near-saturated CaCl<sub>2</sub> solution. As a consequence of this high salinity, Don Juan Pond generally remains unfrozen in winter, even at temperatures below -50°C. Don Juan Pond is the site where antarcticite (CaCl<sub>2</sub>·6H<sub>2</sub>O) was first identified forming naturally. The objective of this paper is to demonstrate the utility of a chemical thermodynamic model (FREZCHEM) by developing theoretical stability diagrams for ice, halite (NaCl), hydrohalite (NaCl·2H<sub>2</sub>O), and antarcticite in Don Juan Pond, using experimental data collected on 34 days between 1961 and 1983. The model is compatible with the experimental data, and predicts the formation of ice during rare high water periods, halite, and antarcticite. These solid phases have all been reported from Don Juan Pond. The model also predicts the formation of hydrohalite at subzero temperatures; hydrohalite has never been observed at Don Juan Pond, but this may simply reflect that most sampling was done during the summer when halite is thermodynamically more stable than hydrohalite. The FREZCHEM model may prove useful in elucidating the physicochemical behavior, the origin of salinity, and the evolution of antarctic lakes. (Auth. mod.)

#### E-56876

Divakara Rao, V., **Precambrian bimodal volcanism in Weddell Sea, West Antarctica**, *Geological Society of India. Journal*, Feb. 1996, 45(2), p.163-174, 26 refs.

**DLC QE1.G3354**

Rhyolites and basalts constitute bulk of the bimodal volcanism in the Bertrab and Littlewood nunataks of Weddell Sea area. Rhyolites with occasional granophyres from the two nunataks are compositionally similar except for high Ba in Littlewood. Basalts, of tholeiitic to calc-alkaline nature are mainly from the Bertrab nunatak and show composi-



tional variation (basalt to basaltic-trachy-andesite) both in major ( $\text{SiO}_2$  45.82 to 53.81%,  $\text{MgO}$  4.67 to 11.20%,  $\text{Na}_2\text{O}$  1.58 to 4.26%) and trace elements (V, Cr, Rb, Sr and Ba). The rare earth elemental abundances and their distribution patterns in the rhyolites from the two nunataks are broadly similar with comparable total REE (Bertrab 80.33; Littlewood 86.82), moderate LREE/HREE fractionation ( $\text{Ce}_N/\text{Yb}_N=4.36$  in Bertrab and 4.33 in Littlewood) and negative europium anomalies. Overall major and trace elemental chemistry of the acid volcanics coupled with the systematic compositional variation from the basic to the acid end suggests a common source of origin for this bimodal volcanism. The source magma, a melt of the upper mantle appears to have evolved in a compressional tectonic regime and has intruded (extruded) in an extensional rift tectonic setting. (Auth.)

#### E-56881

Traub-Metlay, S.G., **Natural thermoluminescence in meteorites and their relation to meteorite concentration mechanisms in the Allan Hills region icefields, Antarctica**, Pittsburgh, University of Pittsburgh, 1993, 181p., University Microfilms order No. 94-21511, Ph.D. thesis. Refs. p.151-158.

Natural thermoluminescence (NTL) in ordinary chondrites can be used to help explain the life-cycle of meteorites, from the orbit of their parent bodies about the sun to their fall and exposure on meteorite stranding surfaces in Antarctica. In addition, analysis of NTL trends with regard to meteorite recovery location on the Allan Hills main icefield may indicate which of several proposed meteorite concentration mechanisms operate in specific stranding sites. Natural TL data provides a means of assessing meteorite exposure to heat and radiation in space, while the meteorite parent body was in orbit about the sun. Some characteristics of these orbits can be inferred by comparing NTL values against  $^{26}\text{Al}$  contents of selected meteorites. This method was used to identify a small group of antarctic meteorites that may have been in high inclination and/or low perihelion orbits. (Auth. mod.)

#### E-56884

Schutt, J., Fessler, B., Cassidy, W.A., **Antarctic Meteorite Location and Mapping Project (AMLAMP): Antarctic meteorite location map series explanatory text and user's guide to AMLAMP data**, U.S. National Aeronautics and Space Administration. Contract report, 1993, NASA-CR-194841, 186p., N94-24964, LPI Technical Report 93-07. Refs. p.175-176.

This technical report is an update to LPI Technical Report 89-02, which contained data and information that was current to May 1987. Since that time approximately 4000 new meteorites have been collected, mapped, and characterized, mainly from the numerous ice fields in the Allan Hills-David Glacier region. Meteorite location maps for ice fields from these regions have been produced and are available. This report includes explanatory texts for the maps of new areas and provides information on updates of maps of the areas covered in LPI Technical Report 89-02. Sketch maps and description of locales that have been searched and have yielded single or few meteorites are also included. The meteorite listings for all the ice fields have been updated to include any classification changes and new meteorites recovered from ice fields in the Allan Hills-David Glacier region since 1987. Information on how to access AMLAMP data, its formats, and ways it can be used are given in the User's Guide to AMLAMP Data section. Meteorite location maps and thematic maps may be ordered from the Lunar and Planetary Institute. Ordering information is given in Appendix A. (Auth. mod.)

#### E-56885

Blattner, P., Grindley, G.W., Adams, C.J., **Low- $^{18}\text{O}$  terranes tracking Mesozoic polar climates in the South Pacific**, *Geochimica et cosmochimica acta*, Feb. 1997, 61(3), p.569-576, Refs. p.575-576.

Substantially negative  $\delta^{18}\text{O}$  values of altered rocks are an unfailing guide to  $^{18}\text{O}$ -depleted meteoric water of low mean annual temperature, and therefore of cold climates at times of hydrothermal alteration. However, because water-rock interaction is often incomplete even where it has occurred, the lack of depleted values is poor evidence for lack of cold climate. A now established average surface rock composition of -6.6 per mill  $\delta^{18}\text{O}$ , with a lower limit of -16 per mill, for an igneous and metamorphic terrane of some 6,000  $\text{km}^2$  in West Antarctica indicates Cretaceous

meteoric water of less, or much less, than -20 per mill. This new anomaly and similar anomalies in New Zealand date from before rifting along the Antarctic-Pacific Rise and are tracking terranes originating from the Mesozoic south polar archipelago. In this area subaerial, or subglacial, hydrothermal isotope exchange has been particularly effective, and/or meteoric waters were isotopically unusually depleted. The discovery, mapping, and dating of further isotopically depleted zones in the geologic record will improve constraints for Paleozoic and Mesozoic greenhouse climates. (Auth.)

#### E-56901

Askin, R.A., Jacobson, S.R., **Palynological change across the Cretaceous-Tertiary boundary on Seymour Island, Antarctica: environmental and depositional factors**, Cretaceous-Tertiary mass extinctions: biotic and environmental changes. Edited by N. MacLeod and G. Keller, New York, W.W. Norton & Company, 1996, p.7-25, Refs. p.21-25.

**DLC QE721.2.E97C74 1996**

Palynomorphs are the only microfossil group preserved consistently and abundantly throughout the Cretaceous-Tertiary (K-T) transition on Seymour I. Calcareous microfossils (planktonic foraminifera and calcareous nannofossils), typically used to define marine K-T successions elsewhere in the world, are absent in Seymour I. K-T boundary sections. On Seymour I., palynomorphs include marine dinoflagellate cysts (dinocysts), acritarchs, and other algae, including colonial forms; and terrestrially derived spores and pollen from land plants, fungal spores and fruiting bodies, and various fresh- to brackish-water algae. These organic-walled microfossils are useful for interpreting age and environmental conditions at and near the K-T boundary. The authors outline factors that could affect palynomorph assemblage composition and K-T palynostratigraphy on Seymour I., describe the marine and nonmarine palynomorph records, and discuss their relations to environmental changes.

#### E-56902

MacLeod, N., **Nature of the Cretaceous-Tertiary planktonic foraminiferal record: stratigraphic confidence intervals, Signor-Lipps effect, and patterns of survivorship**, Cretaceous-Tertiary mass extinctions: biotic and environmental changes. Edited by N. MacLeod and G. Keller, New York, W.W. Norton & Company, 1996, p.85-138, Refs. p.131-138.

**DLC QE721.2.E97C74 1996**

This report is based on samples collected from Denmark, Spain, Brazos River, TX, and Ocean Drilling Program (ODP) Site 738, Kerguelen Plateau. The distribution of these sections and cores plotted on a paleogeographic reconstruction of continental positions at 65 Ma is shown in a figure, and a summary of their depositional environments is shown in another. The exact sample positions were provided in the biostratigraphic literature included. The concept known as the Signor-Lipps effect restates that fossil data are complex and often imperfect records of the past. Many quantitative techniques are available to test aspects of local fossil records to determine whether they have been biased in particular directions. Herein, stratigraphic confidence limits and tests associated with the Signor-Lipps effect are used to examine the planktonic foraminiferal fossil records of the four study sections and/or cores.

#### E-56903

Zinsmeister, W.J., Feldmann, R.M., **Late Cretaceous faunal changes in the high southern latitudes: a harbinger of global biotic catastrophe?**, Cretaceous-Tertiary mass extinctions: biotic and environmental changes. Edited by N. MacLeod and G. Keller, New York, W.W. Norton & Company, 1996, p.303-325, Refs. p.321-325.

**DLC QE721.2.E97C74 1996**

In order to resolve the cause of the Cretaceous-Tertiary extinction event, the authors integrate all physical and biological data available. They examine the Late Cretaceous-earliest Tertiary shallow-marine record from the Antarctic Peninsula and compare it with the temporal record from the temperate and tropical latitudes. The significance of the latitudinal disappearance of ammonite families from the antarctic faunas



is addressed, with the conclusion that it strongly supports the hypothesis that the development of new environmental conditions, associated with global cooling, precluded their survival in high southern latitudes.

#### E-56904

Priscu, J.C., Downes, M.T., McKay, C.P., **Extreme supersaturation of nitrous oxide in a poorly ventilated antarctic lake**, *Limnology and oceanography*, Nov. 1996, 41(7), p.1544-1551, 46 refs.

Lake Bonney, a permanently ice-covered antarctic lake, has a mid-depth maximum  $N_2$  concentration of  $41.6 \mu M$  N in its east lobe, representing the highest level yet reported for a natural aquatic system. Atmospheric  $N_2O$  over the lake was 45% above the global average, indicating that this lake is an atmospheric source of  $N_2O$ . Apparent  $N_2O$  production (ANP) was correlated with apparent oxygen utilization (AOU), and denitrification was not detectable, implying that nitrification is the primary source for this gas. The slope of a regression of ANP on AOU revealed that potential  $N_2O$  production per unit of potential  $O_2$  consumed in the east lobe of Lake Bonney is at least two orders of magnitude greater than reported for the ocean. The maximum yield ratio for  $N_2O$  [ $ANP/(NO_2^- + NO_3^-)$ ] in Lake Bonney is 26%, i.e. 1 atom of N appears in  $N_2O$  for every 3.9 atoms appearing in oxidized N, which exceeds previous reports for pelagic systems, being similar to values from reduced sediments. Areal  $N_2O$  flux from the lake to the atmosphere is >200 times the areal flux reported for oceanic systems; most of this gas apparently enters the atmosphere through a small moat that occupies ca. 3% of the surface of the lake and exists for ca. 10 weeks in summer. (Auth.)

#### E-56905

Kirschvink, J.L., Maine, A.T., Vali, H., **Paleomagnetic evidence of a low-temperature origin of carbonate in the Martian meteorite ALH84001**, *Science*, Mar. 14, 1997, 275(5306), p.1629-1633, 31 refs.

Indirect evidence for life on Mars has been reported from the study of meteorite ALH84001. The formation temperature of the carbonates is controversial; some estimates suggest  $20^\circ$  to  $80^\circ C$ , whereas others exceed  $650^\circ C$ . Paleomagnetism can be used to distinguish between these possibilities because heating can remagnetize ferrimagnetic minerals. Study of two adjacent pyroxene grains from the crushed zone of ALH84001 shows that each possesses a stable natural remanent magnetization (NRM), implying that Mars had a substantial magnetic field when the grains cooled. However, NRM directions from these particles differ, implying that the meteorite has not been heated significantly since the formation of the internal crushed zone about 4 billion years ago. The carbonate globules postdate this brecciation, and thus formed at low temperatures. (Auth.)

#### E-56906

Valley, J.W., Eiler, J.M., Graham, C.M., Gibson, E.K., Romanek, C.S., Stolper, E.M., **Low-temperature carbonate concretions in the Martian meteorite ALH84001: Evidence from stable isotopes and mineralogy**, *Science*, Mar. 14, 1997, 275(5306), p.1633-1638, 66 refs.

The martian meteorite ALH84001 contains small, disk-shaped concretions of carbonate with concentric chemical and mineralogical zonation. Oxygen isotope compositions of these concretions, measured by ion microprobe, range from  $\delta^{18}O = +9.5$  to  $+20.5$  per mill. Most of the core of one concretion is homogeneous ( $16.7 \pm 1.2$  per mill) and over 5 per mill higher in  $\delta^{18}O$  than a second concretion. Orthopyroxene that hosts the secondary carbonates is isotopically homogeneous ( $\delta^{18}O = 4.6 \pm 1.2$  per mill). Secondary  $SiO_2$  has  $\delta^{18}O = 20.4$  per mill. Carbon isotope ratios measured from the core of one concretion average  $\delta^{13}C = 46 \pm 8$  per mill, consistent with formation on Mars. The isotopic variations and mineral compositions offer no evidence for high temperature ( $>650^\circ C$ ) carbonate precipitation and suggest non-equilibrium processes at low temperatures ( $<ca. 300^\circ C$ ). (Auth.)

#### E-56916

Webb, P.N., ed, Wilson, G.S., ed, **Cape Roberts Project: Antarctic stratigraphic drilling. Proceedings of a meeting to consider the project science plan and potential contributions by the U.S. science community, 6-7 March, 1994, Ohio State Uni-**

**versity. Byrd Polar Research Center. Report, 1995, BPRC No.10, 117p., Refs. p.81-93.**

This report provides a record of the proceedings of the United States Cape Roberts Project (CRPUS) workshop held at the Ohio State University in Mar. 1994. Some 43 scientists from U.S. institutions contributed to statements of interest presented by the 31 scientists who attended the workshop. The primary interest areas were geophysics, tectonic history, structural and igneous geology; stratigraphy, sedimentology, mineralogy, geochemistry, down-hole geophysics, and magnetostratigraphy; and marine-terrestrial paleontology and biostratigraphy, paleoclimate, and paleoceanography. Presented here are the highlights of the principal points of discussion, special issues, statements, and recommendations.

#### E-56926

Ren, L.D., Liu, X.H., **Sm-Nd mineral isochron of mafic granulite from the Søstrene Island, East Antarctica**, *Antarctic research*, Dec. 1996, 7(2), p.94-98, 11 refs.

Redetermination of the metamorphic age of the garnet-bearing mafic granulite from the Søstrene I. has been made and an isochron of whole rock-garnet-pyroxene-plagioclase is obtained, giving an age of  $[604 \pm 28(2\sigma)]$  Ma. It is pointed out that this age represents the time of peak granulite facies metamorphism of the area. As to the geological relation of the Søstrene I., Bolingen Is. and the Larsemann Hills to the east, it is deduced from the rock assemblages, metamorphic superposition, spatial changes and metamorphic ages between the above regions that the degree of the superposition of the later low pressure metamorphism is becoming stronger from west to east. The evolution of the earlier medium pressure to later low pressure implies probably the substages of the same metamorphic cycle. (Auth.)

#### E-56927

Xue, Y.S., Shen, Y.B., Zhuo, E.J., **Petrological characteristics of the sedimentary volcanoclastic rocks of the Fossil Hill Formation (Eocene) in King George Island, West Antarctica**, *Antarctic research*, Dec. 1996, 7(2), p.99-117, 16 refs.

The Fossil Hill Formation of the type section composed chiefly of the sedimentary-volcanoclastic breccia and tuffites can be divided into 2 cycles of sedimentation. The thermal fluid was active in the coarse volcanoclastic deposits of the lower cycle, it led to the formation of laumontite, analcite, albite and regularly hybrid mineral of interlayered chlorite and montmorillonite, which are absent from the upper cycle, and to the transportation and concentration of some of trace elements between the coarser tuffites and the overlying fine tuffite bed at the upper part of this cycle. So-called "rain print" and "mud crack" actually are non-sedimentary originally, they were formed respectively by shedding of the small zeolitized concretions on the bedding plane and tectonic pressed stress. The evidence indicates that the Fossil Hill Formation of the Fossil Hill section was deposited in an intermontane lake affected by volcanic action and seasonal flood under the condition of warm and moist climate. (Auth.)

#### E-56928

Chen, C.Y., **Preliminary study on late Quaternary foraminiferal assemblage in the Bransfield Strait, West Antarctica and its significance of environment**, *Antarctic research*, Dec. 1996, 7(2), p.118-125, 11 refs.

Twenty-one foraminiferal species, including 14 genera were found in 39 samples of core PC10, from the Bransfield Strait. They are divided into 3 assemblages: siliceous shell assemblage; calcareous shell assemblage; and mixed shell assemblage. The siliceous shell assemblage occurred in normal deep-sea waters, with weaker water-dynamic condition. The calcareous shell assemblage was formed by turbidity flow, while the mixed shell assemblage represented intense- to weaker-water dynamic condition, changing from warm to cold to warm during the Late Quaternary. (Auth. mod.)

#### E-56929

Tu, X., Zheng, F., **Study of Foraminifera in the core NP93-2 from the Prydz Bay, Antarctica**, *Antarctic research*, Dec. 1996, 7(2), p.126-140, 12 refs.



Analyses of the core NP93-2 from Prydz Bay shows that the sediments are rich in Foraminifera which planktonic Foraminifera make up 26.3% of the total number. The arenaceous agglutinated benthic foraminiferal assemblages are prevailing, with 57.9% of the total number of benthic Foraminifera. The typical benthic foraminiferal assemblage of *Miliammina arenacea* represents a deep-water assemblage. Variations of content of warm and cold species of planktonic Foraminifera reflect the paleoclimatic changes and also reveal the paleo-environmental changes in this region and its relationship with the global changes. Other paleoceanographic and paleoclimatological questions, such as water depth and carbonate dissolution, are also addressed. (Auth. mod.)

#### E-56930

Cai, H.M., **Holocene ostracoda and sedimentary environment implication in the core NG93-1 from the Great Wall Bay, Antarctica**, *Antarctic research*, Dec. 1996, 7(2), p.141-149, 12 refs.

The Holocene ostracods are analyzed from the core sample NG93-1 collected near the Great Wall Station during 1992-93. Eleven genera of 21 species have been identified in the sediments; the most abundant being *Loxoreticulatum fallax*, followed by *Xestoleberis keguelensis*, *Xestoleberis* spp., *Semicytherura* spp., and *Australicythere polylyca*. Most species are those known in the Antarctic. Based on the study of ostracoda from the core NG93-1, it is suggested that their sedimentary environment may be the offshore shallow seawater. (Auth. mod.)

#### E-56932

Wu, S.G., Lou, Y.L., Wang, Y.Q., Lu, J., Zheng, F., Sun, S.X., **Holocene glacial-marine sedimentation in the Prydz Bay, Antarctica**, *Antarctic research*, Dec. 1996, 7(2), p.164-172, 9 refs.

The typical glacial-marine sedimentation has been recorded from core NP93-2 in the Prydz Bay. The sedimentation processes, sedimentary environment and paleoclimate variations since 12937 a.B.P. are discussed, based on grain size, mineral composition and micropaleontological data. The climate variation occurred at 10 ka, indicating that there were increased inputs of terrigenous clastics. (Auth. mod.)

#### E-56942

Jull, A.J.T., Eastoe, C.J., Cloudt, S., **Isotopic composition of carbonates in the SNC meteorites, Allan Hills 84001 and Zagami**, *Journal of geophysical research*, Jan. 25, 1997, 102(E1), p.1663-1669, 50 refs.

The new studies on Allan Hills 84001 confirm previous conclusions that the Fe, Mg-rich carbonate grains in this meteorite contain carbon with  $\delta^{13}\text{C}$  as high as +45 per mill. In contrast, the carbon released from Zagami is depleted in  $^{13}\text{C}$  with  $\delta^{13}\text{C}$  as low as -20 per mill. The authors conclude that the isotopic composition of the carbon as carbonate released from acid etching of Zagami is different from the carbonates observed in both Allan Hills 84001 and Nakhla. With the assumption that all of these meteorites sample the surface of Mars, they propose that the Zagami carbonate samples a different carbon reservoir on this planet, such as a magmatic source. With this interpretation, the high  $\delta^{13}\text{C}$  values of carbonate observed in Allan Hills 84001 and Nakhla can be ascribed to a fractionated source compared with the originally light carbon. A likely origin for this  $^{13}\text{C}$ -enriched component is an isotopically heavy Martian atmosphere; however, given the possibility of biological activity involving Allan Hills carbonates, we cannot exclude this as a source of the isotopic fractionation. (Auth. mod.)

#### E-56943

Mittlefehldt, D.W., Lindstrom, M.M., **Magnesium basalt clasts from the EET 92014 and Kapoeta howardites and a discussion of alleged primary magnesian HED basalts**, *Geochimica et cosmochimica acta*, Jan. 1997, 61(2), p.453-462, 35 refs.

The EET 92014 clast is enriched in the refractory incompatible lithophile elements and shows a refractory lithophile element pattern similar to Stannern and Bouvante. The clast is enriched in  $\text{Cr}_2\text{O}_3$  and  $\text{MgO}$  and depleted in  $\text{Al}_2\text{O}_3$  and  $\text{CaO}$  compared to main group or Stannern trend eucrites. Based on bulk major and trace lithophile element composition, this pyroxene-phyric clast cannot be directly related to

basaltic eucrites. This clast is either an impact melt of a trace element-rich, polymict eucrite or howardite target, or a primary melt of a more magnesian source region than that which produced basaltic eucrites. The authors favor the former interpretation. Low siderophile element abundances, within the ranges for monomict eucrites, indicate <0.5% chondritic contamination in the clast, however. The Kapoeta clast has a major element composition within the range of howardites and likely is an impact melt of such a target lithology. Comparison with other reported magnesian basalt clasts from howardites indicates that in all likelihood, all heretofore alleged primary magnesian basalt clasts are impact melts of polymict targets. Two magnesian eucrites, ALHA81001 and Pomozdino, and magnesian eucrite clasts from the polymict eucrite Petersburg may possibly be primary melts of a magnesian source region not directly related to basaltic eucrites. (Auth. mod.)

#### E-56944

Becker, L., Glavin, D.P., Bada, J.L., **Polycyclic aromatic hydrocarbons (PAHs) in antarctic Martian meteorites, carbonaceous chondrites, and polar ice**, *Geochimica et cosmochimica acta*, Jan. 1997, 61(2), p.475-481, 33 refs.

The distribution of PAHs observed in ALH84001 was interpreted as being inconsistent with a terrestrial origin and were claimed to be indigenous to the meteorite, perhaps derived from an ancient martian biota. Many of the same PAHs detected in the ALH84001 carbonate globules are present in antarctic carbonaceous chondrites and in both the matrix and carbonate (druse) component of EETA79001. Carbonate is an effective scavenger of PAHs in ice meltwater. Moreover, the distribution of PAHs in the carbonate extract of antarctic Allan Hills ice is remarkably similar to that found in both EETA79001 and ALH84001. The reported presence of L-amino acids of apparent terrestrial origin in the EETA79001 druse material suggests that this meteorite is contaminated with terrestrial organics probably derived from antarctic ice meltwater that had percolated through the meteorite. The data suggests that the PAHs observed in both ALH84001 and EETA79001 are derived from either the exogenous delivery of organics to Mars or extraterrestrial and terrestrial PAHs present in the ice meltwater or, more likely, from a mixture of these sources. It would appear that PAHs are not useful biomarkers in the search for extinct or extant life on Mars. (Auth. mod.)

#### E-56945

Weigel, A., Eugster, O., Koeberl, C., Krähenbühl, U., **Differentiated achondrites Asuka 881371, an angrite and Divnoe: noble gases, ages, chemical composition, and relation to other meteorites**, *Geochimica et cosmochimica acta*, Jan. 1997, 61(1), p.239-248, 54 refs.

A study is presented of the noble gas isotopic abundances in two achondrites: Divnoe and the Asuka 881371 andrite. For Divnoe chemical analyses were also made of the major elements and of some minor and trace elements relevant for comparison with other meteorite types and for the interpretation of the noble gas data. Based on the cosmic-ray produced noble gases, an exposure age of 5.4 Ma was obtained for Asuka 881371. For Divnoe, the abundance patterns of several elements and isotopic abundances in Xe and O indicate that this unique meteorite bears a relationship to the brachinite achondrites. Divnoe's asteroid ejection event occurred 17.2 Ma ago. (Auth. mod.)

#### E-56949

Zheng, X.S., Sàbat, F., Smellie, J.L., **Multiple magma generation processes of the volcanic rocks from Livingston Island, West Antarctica: geochemical evidences**, *Antarctic Research (Chinese edition)*, Sep. 1996, 8(3), p.1-12, In Chinese with English summary. Refs. p.11-12.

Meso-Cenozoic volcanic rocks widely distributed on Livingston I. are part of the South Shetland magmatic arc. Early to Late Cretaceous volcanism is particularly well represented, but the magmatism also includes Early Tertiary plutonic tonalite and Holocene volcanic rocks. Eight representative lava and dolerite, as well as tonalite samples were analyzed for Sr, Nd, Pb isotope study. The isotopic composition and other geochemical characteristics of rocks indicate that the magmatic rocks outcropped on different locations in Livingston I. should be from different magma resources with distinguishable isotope features. Therefore multiple magma generation processes of the volcanism in Living-



ston I. have been suggested. The rocks in central Livingston and Hannah Point might have undergone a contamination process when the derived magma had to stay in a shallow chamber. The possible crustal source ("contamination") could be the Early Triassic Miers Bluff Formation, the basement of Livingston I., which is a sequence of continental derived metasedimentary rocks deposited in a submarine fan environment. The Pliocene to Recent volcanism is closely related to the extension of Bransfield Strait and the primary magma was directly derived from the upper mantle by partial melting. (Auth. mod.)

#### E-56952

Li, S.K., **Geomorphological mapping of the Larsemann Hills, East Antarctica**, *Antarctic Research (Chinese edition)*, Sep. 1996, 8(3), p.36-45, In Chinese with English summary. 5 refs.

The Larsemann Hills are a series of gneiss islands and peninsulas extending into Prydz Bay, with an ice-free area of approximately 200 km<sup>2</sup>. The area lies in the pole permafrost zone, aeolian action and periglacial processes controlled the characteristics of modern landform. The geomorphological mapping represents many different aspects: morphologic, geologic, chronologic, genetic and dynamic. Comprehensive description of landforms may necessitate dealing with the above five aspects, at least. (Auth.)

#### E-56956

Choi, B.G., McKeegan, K.D., Leshin, L.A., Wasson, J.T., **Origin of magnetite in oxidized CV chondrites: in situ measurement of oxygen isotope compositions of Allende magnetite and olivine**, *Earth and planetary science letters*, Jan. 1997, 146(1-2), p.337-349, 42 refs.

Magnetite in the oxidized CV chondrite Allende, an antarctic meteorite, mainly occurs as spherical nodules in porphyritic-olivine (PO) chondrules, where it is associated with Ni-rich metal and/or sulfides. To help constrain the origin of the magnetite, oxygen isotopic compositions of magnetite and coexisting olivine grains in PO chondrules of Allende were measured by an *in situ* ion microprobe technique. The magnetite is not in isotopic equilibrium with the olivine in PO chondrules, implying that it formed after the chondrule formation. The  $\Delta^{17}\text{O}$  of the magnetite is somewhat more negative than estimates for the ambient solar nebula gas. It is inferred that the magnetite formed on the parent asteroid by oxidation of metal by H<sub>2</sub>O which had previously experienced minor O isotope exchange with fine-grained silicates. (Auth. mod.)

#### E-56957

Veevers, J.J., Walter, M.R., Scheibner, E., **Neoproterozoic tectonics of Australia-Antarctica and Laurentia and the 560 Ma birth of the Pacific Ocean reflect the 400 m.y. Pangean supercycle**, *Journal of geology*, Mar. 1997, 105(2), p.225-242, Refs. p.239-242.

Unequivocal evidence for the Proterozoic reconstruction of Australia-Antarctica and Laurentia remains elusive. The synchronous rifting and drifting reflect the tectonics of a late Neoproterozoic Pangea (East Gondwanaland and Laurentia) that amalgamated along the Mozambique belt ca. 720 Ma and broke up at 560 Ma by growth of the Paleopacific and Iapetus oceans. In this paper these events are interpreted as part of a 400 m.y. supercycle comparable to the 320 Ma and amalgamation of Pangea A and its 160 Ma breakup during Supercycle A (320 Ma to present). Events near the end of the Cambrian (500 Ma) in East Gondwanaland included intense deformation and intrusion by granite of the Antarctic and southeastern Australian margins, followed by a global sea-level maximum. The previous Pangean amalgamation, indicated by the global 1100 Ma (Grenvillian) deformation, suggests a third supercycle that introduced the modern regime of plate tectonics. (Auth. mod.)

#### E-56959

Gibson, G.M., Ireland, T.R., **Extension of Delamerian (Ross) orogen into western New Zealand: evidence from zircon ages and implications for crustal growth along the Pacific margin of Gondwana**, *Geology*, Dec. 1996, 24(12), p.1087-1090, 26 refs.

Ion-microprobe zircon U/Pb age data are presented for two metasedimentary sequences in Fiordland, New Zealand: one is a correlative of the Lachlan fold belt in southeast Australia and incorporates metamor-

phosed Ordovician turbidites intruded by S-type granites, and the other is equivalent in age to the older Delamerian fold belt and is derived from Cambrian-Ordovician protoliths (Kanmantoo Group) intruded by 480 Ma granitic orthogneiss. The latter is considered to be representative of basement not only in New Zealand but also in the formerly contiguous regions of southeast Australia and Antarctica. This basement underwent melting and low-pressure—high-temperature metamorphism at 350-370 Ma. (Auth. mod.)

#### E-56976

Bradley, J.P., Harvey, R.P., McSween, H.Y., Jr., **Magnetite whiskers and platelets in the ALH84001 Martian meteorite: Evidence of vapor phase growth**, *Geochimica et cosmochimica acta*, Dec. 1996, 60(24), p.5149-5155, 46 refs.

Nanometer-sized magnetite crystals associated with carbonates in fracture zones within Martian meteorite ALH84001 have been examined using analytical transmission electron microscopy. Some of the crystals exhibit distinctive morphologies: filamentary rods and ribbons, and platelets. The rods and ribbons are elongated along the crystallographic [100] and [111] directions. Some of the rods contain microstructural defects indicating that they grew by spiral growth about screw dislocations. Platelets are flattened along the [100] and [110] directions. These unique morphologies and microstructures constrain the growth conditions of magnetite. The whiskers and platelets most likely formed in the temperature range 500-800°C by direct condensation from a vapor or precipitation from a supercritical fluid, and their properties are inconsistent with a biogenic origin. (Auth.)

#### E-57003

Souto Gonçalves, H.M., Dehnhardt, B.A., **Recognition of two calcareous nanofossil zones on the Falkland Plateau** [Reconhecimento das zonas *Chiasmolithus altus* e *Emiliana huxleyi*, nanofósseis calcários do Banco Maurice Ewing, Antártica], *Pesquisas*, 1995, 22(1-2), p.3-11, In Portuguese with English summary. 17 refs.

The calcareous nannofossil study of core-43, situated at Maurice Ewing Bank permitted the recognition of *Chiasmolithus altus* Burky & Percival, 1971 and *Emiliana huxleyi* (Lohmann, 1902) Hay & Mohler, 1967 cosmopolitan taxon. Two biostratigraphic zones were determined: the *C. altus* Zone of the Wise Jr., 1983 (lower/upper Oligocene) and *E. huxleyi* Zone of the Wise Jr. & Wind, 1977 (Holocene). The distribution of identified taxa throughout that zone is presented. The high number of placoliths distal shields permitted to infer that these sediments were deposited immediately above the lisocline. A correlation of the *C. altus* Zone of Wise Jr., 1983 with the *Sphenolithus distentus* Zone (base) and the *Sphenolithus ciperoensis* Zone (top) of Burky, 1973 correspondents to lower Oligocene is proposed. Evidence of dissolution and cold climate during the Oligocene was detected, which is considered responsible for the preservation of the calcareous nannofossils. (Auth. mod.)

#### E-57007

Ligi, M., et al, **Death and transfiguration of a triple junction in the South Atlantic**, *Science*, Apr. 11, 1997, 276(5310), p.243-245, 20 refs.

Three major lithospheric plates—Antarctic, South American, and African—meet in the South Atlantic near Bouvet I. where the Mid-Atlantic Ridge (MAR), the Southwest Indian Ridge (SWIR), and the American Antarctic Ridge converge toward a fast evolving triple junction. A major magmatic pulse has recently built a new, swollen segment of the SWIR (Spiess Ridge) that is propagating toward the MAR at a rate of 4 to 5 cm/y, disrupting a former ridge-ridge-ridge (RRR) triple junction. A new triple junction will be established about 70 km to the north when the propagating SWIR/Spiess segment will impact with the MAR, probably within the next 1 million years. The American Antarctic-Ridge will take advantage of the MAR/SWIR duel by capturing an approximately 70-km stretch of MAR, which will increase the size of the Antarctic Plate. (Auth.)

#### E-57028

Francalanci, G., Pieri, M., **Physical configuration of Antarctica: a summary**, *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi*



*di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.483-495, 3 refs.

#### DLC JX4084.A5I58 1987

The present physical configuration of Antarctica is the result of its geological history. This article gives a brief account of that history. The continent, which in separating itself from other parts of the old Pangea (South America, Africa, Malagasy, India, Sri Lanka, Australia, New Zealand) constitutes one of the poles of the terrestrial axis, is considered to be a laboratory which can still reveal many secrets. Various geological and glaciological maps accompany the text.

#### E-57046

Long, J.A., Young, G.C., **Sharks from the Middle-Late Devonian Aztec Siltstone, southern Victoria Land, Antarctica, Western Australian Museum. Records**, 1995, 17(3), p.287-308, Refs. p.306-308.

Shark teeth representing 3 new taxa are described from the Middle-Late Devonian Aztec Siltstone of southern Victoria Land. *Portalodus bradshawae* gen. et sp. nov. is represented by large dipodont teeth which have a base with a well-produced labial platform. It occurs in the middle to upper sections of the Aztec Siltstone. *Aztecodus harmsenae* gen. et sp. nov. is represented by broad bicuspid teeth, wider than high, with numerous medial crenulations and twin nutritive foramina penetrating the rectangular base. It occurs in the middle sections of the Aztec Siltstone. The teeth of *Anareodus statei* gen. et sp. nov. are characterized by having a main cusp which is more than twice as high as the second cusp, a small cusplet developed on the outer cutting edge of the main cusp, sometimes with few crenulations developed in the middle of the two cusps, and the base is strongly concave. (Auth. mod.)

#### E-57047

Mukasa, S.B., Dalziel, I.W.D., **Southernmost Andes and South Georgia Island, North Scotia Ridge: Zircon U-Pb and muscovite  $^{40}\text{Ar}/^{39}\text{Ar}$  age constraints on tectonic evolution of Southwestern Gondwanaland**, *Journal of South American earth sciences*, Sep.-Nov. 1996, 9(5-6), p.349-365, Refs. p.363-365.

Zircon U-Pb and muscovite  $^{40}\text{Ar}/^{39}\text{Ar}$  isotopic ages have been determined on rocks from the southernmost Andes and South Georgia to provide absolute time constraints on the kinematic evolution of southwestern Gondwanaland. The U-Pb systematics of 4 zircon fractions from one sample show that proto-marginal basin magmatism in the northern Scotia arc, creating the peraluminous Darwin granite suite and submarine rhyolite sequences of the Tobifera Formation, had begun by the Middle Jurassic (164.1±1.7 Ma). Seven zircon fractions from two other Darwin granites are discordant with non-linear patterns, suggesting a complex history of inheritances and Pb loss. Reference lines drawn through these points on concordia diagrams give upper intercept ages of ca. 1500 Ma, interpreted as a minimum age for the inherited zircon component. This component is believed to have been derived from sedimentary rocks in the Gondwanaland margin accretionary wedge that forms the basement of the region, or else directly from the cratonic "back stop" of that wedge. (Auth. mod.)

#### E-57068

Abelmann, A., Gowing, M.M., **Spatial distribution pattern of living polycystine radiolarian taxa - baseline study for paleoenvironmental reconstructions in the Southern Ocean (Atlantic sector)**, *Marine micropaleontology*, Mar. 1997, 30(1-3), p.3-28, Refs. p.26-28.

The horizontal and vertical distribution of living polycystine radiolarian taxa was investigated at seven locations on a N-S transect between the Antarctic Zone and the Subtropical zone in the South Atlantic Ocean. Four to five depth intervals, from 0 to 1000 m, were sampled with 55 µm mesh opening/closing nets in combination with a hydrographic CTD survey. A factor analysis for the delineation of specific assemblages and the relation between different taxa and taxa groups resulted in 8 factors, of which 5 represent surface and subsurface factors and 3 deep water factors. The spatial distribution pattern of the factors shows that distinct radiolarian assemblages are closely related to water depth, distribution of water masses, hydrographic boundaries such as

frontal systems, and nutrients. This documents that the distribution of individual radiolarian assemblages is controlled by specific hydrographic conditions and water depth, and allows the definition and consolidation of the autecological demands. These data are crucial for the paleoenvironmental interpretation of fossil polycystine radiolarian assemblages. (Auth. mod.)

#### E-57069

Nishimura, A., Nakaseko, K., Okuda, Y., **New coastal water radiolarian assemblage recovered from sediment samples from the Antarctic Ocean**, *Marine micropaleontology*, Mar. 1997, 30(1-3), p.29-44, Refs. p.43-44.

The study of circum-antarctic sediment samples from south of 60°S reveals the presence of a distinctive coastal assemblage in shallow waters around Antarctica. This assemblage consists primarily of just two species, *Rhizoplegma boreale* (Cleve) and *Phormacantha hystrix* (Cleve)/*Plectacantha oikiskos* (Jørgensen) group. This assemblage resembles assemblages from Norwegian fjords in both its taxonomic composition and low diversity. It is distinguished from the typical 'open ocean' antarctic assemblage with its high diversity. The distribution of the coastal assemblage appears to be determined mainly by water depth or proximity to the coastline rather than temperature. (Auth.)

#### E-57070

Takemura, A., Ling, H.Y., **Eocene and Oligocene radiolarian biostratigraphy from the Southern Ocean: correlation of ODP Legs 114 (Atlantic Ocean) and 120 (Indian Ocean)**, *Marine micropaleontology*, Mar. 1997, 30(1-3), p.97-116, Refs. p.114-116.

Eocene-oligocene radiolarians from Ocean Drilling Program Sites 699, 702, and 703, Leg 114 of the Atlantic Ocean, were examined. A tripartite zonation was determined for the recovered cores, based on results of similar analysis of Leg 120 submarine sediments from the Indian Ocean. Correlation of the two oceans is made by examining 23 biohorizons and the three zones, *Eucyrtidium spinosum*, *Axoprunum irregularis*, and *Lychnocanoma conica*, in ascending stratigraphic order. One new species, *Eucyrtidium nishimurae*, is described. (Auth.)

#### E-57071

Crosta, X., Pichon, J.J., Labracherie, M., **Distribution of *Chaetoceros* resting spores in modern peri-Antarctic sediments**, *Marine micropaleontology*, Feb. 1997, 29(3-4), p.283-299, Refs. p.298-299.

One hundred and sixty-five surface sediment samples from the southern ocean were examined for distribution and relative abundance of *Chaetoceros* resting spores. The contribution of resting spores to the total diatom assemblage ranges from 9% in the Subantarctic Zone to 95% in the Antarctic Peninsula sector. On the basis of both absolute and relative abundances four 'biogeographic' zones are distinguished: the Antarctic Peninsula sector, the Embayment Systems (Ross Sea and Weddell Sea), the Continental Shelf zone (water depth <2000 m) and the Deep Ocean (water depth >2000 m). *Chaetoceros* resting spores abundance reaches up to  $900 \times 10^6$  valves/g of dry sediment in the Gerlache Strait. The hydrology of this region is characterized by an intense stratification of the water column due to sea-ice meltwater inputs, continental glacial runoffs and thermal warming of the surface water layer. The authors propose that increased relative abundances of *Chaetoceros* resting spores in fossil diatom assemblages from the southern ocean can therefore be used as tracers of water-column stratification due to glacial melt water. (Auth. mod.)

#### E-57072

Whitehead, J.M., McMinn, A., **Paleodepth determination from Antarctic benthic diatom assemblages**, *Marine micropaleontology*, Feb. 1997, 29(3-4), p.301-318, Refs. p.316-318.

Analysis of modern surface sediments from fjords in the Vestfold Hills indicates that 58% of the variation in benthic diatom assemblages can be attributed to changes in environmental parameters with water depth. Attenuation of light through the water column is suggested to account for 45% of the variation, and the decrease in substrate grain size with depth possibly accounts for a further 13%. Cluster analysis and principal component analysis were used to objectively circumscribe five



floral zones between the surface and 35 m depth. The depth distribution of the benthic diatoms was then used to interpret the paleodepth of relict fjord (Holocene) sediments exposed around Deep Lake in the Death Valley. Paleodepths measured from the sea-ice bench around Deep Lake combined with data from grain size analysis indicate that the relict fjord sediments have no analogue amongst the modern fjord sediments sampled in the Vestfold Hills. (Auth. mod.)

#### E-57073

Marret, F., De Vernal, A., **Dinoflagellate cyst distribution in surface sediments of the southern Indian Ocean**, *Marine micropaleontology*, Feb. 1997, 29(3-4), p.367-392, Refs. p.391-392.

The authors analyzed 70 surface sediment samples collected in the southern Indian Ocean. A total of 53 dinoflagellate cyst taxa were identified, and two new endemic species are described: *Selenopemphix antarctica* sp. nov. and *Impagidinium variaseptum* sp. nov. Dominant taxa allowed the recognition of assemblages which show a latitudinal distribution. The circum-antarctic domain is characterized by assemblages dominated by *S. antarctica* sp. nov. and accompanied by *I. pallidum*. The Subantarctic domain is marked by the dominance of *Brigantedinium* spp. accompanied by *Nematosphaeropsis labyrinthus*. The Subtropical domain shows high species diversity, taxa dominance varying along onshore to offshore gradient. Principal component analysis illustrates that the distribution of dinoflagellate cyst assemblages is controlled by temperature and salinity. Transfer functions based on the best analogues method are developed to reconstruct past sea-surface conditions. (Auth. mod.)

#### E-57087

Acosta, J., Uchupi, E., **Transtensional tectonics along the south Scotia Ridge, Antarctica**, *Tectonophysics*, Dec. 30, 1996, 267(1-4), p.31-56, Refs. p.55-56.

Multichannel seismic reflection profiles recorded aboard B/O *Hespérides* during the summer of 1991-92 were used to identify the tectonic style of the south Scotia Ridge along the Scotia-Antarctic plate boundary. The ridge is composed of continental crustal fragments transported eastward from the South America-Antarctic isthmus 28 to 6 Ma during the opening of Drake Passage. It is made up of two highs (north and south branches of the south Scotia Ridge) separated by a central depression that contains four narrow deeps. Fragmentation of the ridge during and since its transport to its present position is due to transtensional sinistral motion along the Scotia-Antarctic plate boundary. This fragmentation of the ridge appears to have been in 2 phases. During an early phase of transtension, which probably took place in the Oligocene, a half graben fronted by a high along its northern edge was formed along the southern flank of the ridge. Concurrent with this transtension episode an extensive sediment prism was deposited north of the ridge. The second tectonic episode during which the present plate boundary was established in its current location along the central depression may have begun about 4 Ma. (Auth. mod.)

#### E-57089

Carson, C.J., Fanning, C.M., Wilson, C.J.L., **Timing of the Progress Granite, Larsemann Hills: additional evidence for Early Palaeozoic orogenesis within the east Antarctic Shield and implications for Gondwana assembly**, *Australian journal of earth sciences*, Oct. 1996, 43(5), p.539-553, Refs. p.552-553.

The Progress Granite is one of numerous S-type plutons exposed in the Larsemann Hills region. The granite was emplaced into a migmatitized pelitic to felsic paragneiss sequence during a regional high-grade transpressional event ( $D_2$ ) that pre-dates high-grade extension ( $D_3$ ). Dating for two occurrences of the Progress Granite from  $D_2$  and  $D_3$  structural domains gives the ages of  $516.2 \pm 6.8$  Ma and  $514.3 \pm 6.7$  Ma, respectively. These ages are interpreted as crystallization ages for the Progress Granite and confirm Early Palaeozoic orogenesis in the Larsemann Hills region. This orogen appears to have evolved during continental convergence and is probably responsible for widespread radiogenic isotopic resetting and the near-complete exhumation of the adjacent northern Prince Charles Mountains. The identification of a major Early Palaeozoic orogen in Prydz Bay allows tentative correlation of other domains of Early Palaeozoic tectonism both within the east Antarctic Shield and other, once contiguous, Gondwana fragments and illus-

trates the potential complexity inherent within intercratonic mobile belts. One such possibility, tentatively offered here, suggests a continuous belt of Early Palaeozoic tectonism from Prydz Bay eastward to the West Denman Glacier region and into the Leeuwin complex of western Australia. (Auth.)

#### E-57091

Stilwell, J.D., Levy, R.H., Feldmann, R.M., Harwood, D.M., **On the rare occurrence of Eocene callianassid decapods (Arthropoda) preserved in their burrows, Mount Discovery, East Antarctica**, *Journal of paleontology*, Mar. 1997, 71(2), p.284-287, 13 refs.

Callianassid fossils, preserved within their burrows, collected from Mount Discovery, East Antarctica, provide the first such occurrence in Antarctica as well as evidence for deposition in a shallow marine environment distal to a deltaic system. The age of the specimens, based upon associated dinoflagellate cysts, is late early to middle Eocene. (Auth. mod.)

#### E-57092

Vizcaino, S.F., Bond, M., Reguero, M.A., Pascuai, R., **Youngest record of fossil land mammals from Antarctica; its significance on the evolution of the terrestrial environment of the Antarctic Peninsula during the Late Eocene**, *Journal of paleontology*, Mar. 1997, 71(2), p.348-350, 25 refs.

The record of fossil land mammals from Antarctica has been restricted previously to the middle levels of the Eocene-early Oligocene La Meseta Formation on Seymour I. This mostly shallow-marine sequence was divided informally into seven subunits (Tertiary Eocene, La Meseta or TELM 1 to 7) by Sadler (1988). Land mammals, representing South American lineages of marsupials, edentates, and ungulates were recovered from TELM 3, 4, and 5. The purpose of the present note is to report the discovery of a well-preserved ungulate tooth from the uppermost level of the La Meseta Formation (TELM 7) and to discuss its paleoenvironmental implications.

#### E-57094

McAdoo, D., Laxon, S., **Antarctic tectonics: constraints from an ERS-1 satellite marine gravity field**, *Science*, Apr. 25, 1997, 276(5312), p.556-560, 39 refs.

A high-resolution gravity field of poorly charted and ice-covered ocean near West Antarctica, from the Ross Sea east to the Weddell Sea, has been derived with the use of satellite altimetry, including ERS-1 geodetic phase, wave-form data. This gravity field reveals regional tectonic fabric, such as gravity lineations, which are the expression of fracture zones left by early (65 to 83 mya) Pacific-Antarctic sea-floor spreading that separated the Campbell Plateau and New Zealand continent from West Antarctica. These lineations constrain plate motion history and confirm the hypothesis that Antarctica behaved as two distinct plates, separated from each other by an extensional Bellingshausen plate boundary active in the Amundsen Sea before about 61 mya. (Auth.)

#### E-57121

Bockheim, J.G., **Properties and classification of cold desert soils from Antarctica**, *Soil Science Society of America. Journal*, Jan.-Feb. 1997, 61(1), p.224-231, 29 refs.

Eight pedons representing three climatic zones and parent materials ranging from Holocene to Pliocene were characterized from the Dry Valleys region of Antarctica. All of the soils contain abundant water-soluble salts, including NaCl in coastal regions,  $\text{NaNO}_3$  along the polar plateau, and  $\text{Na}_2\text{SO}_4$  in intermediate areas. The salts originate primarily from atmospheric deposition and accumulate linearly with time. Although the soils bear many features of Aridisols, they fail to meet the requirements of an aridic soil moisture regime because of the very cold temperatures. They could be classified as Cryids if the Aridisols suborder were expanded to include soils with temperatures that never exceed 5 to 8°C. In the proposed Gelisols order for permafrost-affected soils, the soils are classified as Natric, Glacic, and Typic Anhyturbels (evidence of cryoturbation) and Salic and Petrosalic Anhyhaptels (no cryoturbation). (Auth. mod.)



**E-57127**

Fitzsimons, S.J., **Paraglacial redistribution of glacial sediments in Vestfold Hills, East Antarctica**, *Geomorphology*, Mar. 1996, 15(2), p.93-108, 25 refs.

Observations of late Quaternary glaciation and deglaciation of the area and contemporary depositional processes are reported, and a conceptual model of geomorphological change since deglaciation is presented. The model attempts to reconcile the types and rates of contemporary depositional processes with the distribution of deposits and landforms, and to explain why unconsolidated deposits cover less than 20% of the Hills despite the effects of recent glaciation. The lack of unconsolidated deposits in the landscape can be attributed to the combined effects of low debris volumes in the ice and the redistribution of debris during and after deglaciation. Redistribution of debris can be explained by paraglacial processes which are non-glacial sedimentary processes that are directly conditioned by glaciation. Paraglacial sedimentation is a response to rapid adjustment of the debris system after the dominance of glacial conditions, and is characterized by disequilibrium between sediment supply and transportation of sediment by nonglacial processes. Evidence from the Vestfold Hills suggests paraglacial sedimentary processes are dominated by mass movement of glacial debris from slopes and the formation of stable valley fills, and that the main sediment transfers occur within a few thousand years of deglaciation. (Auth. mod.)

**E-57128**

Lundqvist, J., Lilliesköld, M., Östmark, K., **Glacial and periglacial deposits of the Tumbledown Cliffs area, James Ross Island, West Antarctica**, *Geomorphology*, Feb. 1995, 11(3), p.205-214, 23 refs.

Investigations of the glacial geology of an ice-free area between local glaciers on western James Ross I. have shown that recent glaciation consists of small cirque glaciers and outlet glaciers from the central ice-fields. Erratics are evidence of an earlier, more widespread glaciation. Two till types are found in the area, a thin, erratic-bearing older diamicton interpreted as a lodgement till or a glacioteconite and a younger, local till of supraglacial origin forming the recent terminal moraines. The present grounding line lies close to the sea level, resulting in subglacial deposition. A former more extended glacier was grounded further out in the Prince Gustav Channel. Frost action is intense in the cold, continental climate and large volumes of talus are produced. Rock glaciers are common, probably of both talus and glacier derived origin. The glacial and periglacial features, including a kame terrace and a raised beach, imply that the area has been ice-free throughout the Holocene and possibly longer. (Auth.)

**E-57129**

Matsuoka, N., **Rock weathering processes and landform development in the Sør Rondane Mountains, Antarctica**, *Geomorphology*, July 1995, 12(4), p.323-339, 60 refs.

Field observations of weathering processes and the related landforms, combined with laboratory analyses of weathering products, permit a synthetic evaluation of Late Cenozoic weathering environments in the Sør Rondane Mountains, an arid upland characterized by low temperatures and strong winds. Rates and character of weathering depend mainly on moisture availability and the bedrock geology. Under the humid weathering regime that occurs only locally around the margin of the present ice sheet, frequent diurnal freeze-thaw cycles in summer cause relatively rapid rock fragmentation. Most of the mountains are situated in the arid weathering regime, under which rock breakdown is very slow unless the rock contains much salt. Salt weathering becomes more intensive and extensive with exposure age, as a result of salt accumulation in rock, eventually producing soils of fine-silt size. Lack of clay mineralization even in weathered rocks having been exposed above the ice sheet prior to 4 Ma indicates that hydrolysis or carbonation of rock minerals has been insignificant during the past 4 Ma. The final products of weathering are due mainly to salt action and reflect the parent lithology. Resistant fine-grained granite forms strongly oxidized tors carved with tafoni, or fields of mushroom-like boulders overlying the fractured bedrock. Less resistant rocks, such as biotite gneiss and amphibolite, produce stone pavements underlain by saline, silty soils up to 30-40 cm thick, the thickness corresponding to the maximum thaw depth. (Auth. mod.)

**E-57136**

Isbell, J.L., Gelhar, G.A., Seegers, G.M., **Reconstruction of preglacial topography using a postglacial flooding surface: Upper Paleozoic deposits, central Transantarctic Mountains, Antarctica**, *Journal of sedimentary research*, Mar. 1997, 67(2), p.264-273, Refs. p.272-273.

Upper Paleozoic glacial deposits in the central Transantarctic Mountains are the basal deposits within a Late Paleozoic to Early Mesozoic basin that formed along the margin of the East Antarctic Craton. This basin was a foreland basin throughout much of its history, and was part of a larger-scale basin that stretched across the paleo-Pacific margin of Gondwanaland. A flooding surface that separates Upper Paleozoic glacial deposits from overlying postglacial black shales in the central Transantarctic Mountains is used as a datum for reconstructing the preglacial topography. The postglacial flooding surface resulted from flooding of the depositional basin following collapse of the Gondwanide ice sheet. Results using this approach aided in reevaluating the factors that controlled the formation of the depositional basin in Antarctica and in determining the tectonic setting of the paleo-Pacific margin of Antarctica during deposition of the Upper Paleozoic glacial rocks. The use of a flooding surface as a datum is a technique that may be useful for reconstructing paleotopography in other settings. (Auth. mod.)

**E-57137**

Yao, X.L., Taylor, T.N., Taylor, E.L., **Taxodiaceous seed cone from the Triassic of Antarctica**, *American journal of botany*, Mar. 1997, 84(3), p.343-354, Refs. p.353-354.

A silicified seed cone is described from the lower Middle Triassic of Antarctica. The cone measures up to 3.4 cm long and 1.4 cm wide, and consists of helically arranged cone scales attached to a eustelic axis. Bract and ovuliferous scale are approximately of equal length and fused at the base. The bract is entire and vascularized by a single trace. The ovuliferous scale contains five distal lobes, each vascularized by a terete strand that divides to form a smaller trace to each of the five inverted ovules. Ovules are small and flattened with the three-part integument attenuated into oppositely positioned lateral wings. The Triassic specimens are compared with both extant and fossil conifer seed cones and believed to have their closest affinities within the Taxodiaceae. (Auth.)

**E-57140**

Zhao, J.X., Ellis, D.J., Kilpatrick, J.A., McCulloch, M.T., **Geochemical and Sr-Nd isotopic study of charnockites and related rocks in the northern Prince Charles Mountains, East Antarctica: implications for charnockite petrogenesis and proterozoic crustal evolution**, *Precambrian research*, Jan. 1997, 81(1-2), p.37-66, Refs. p.62-66.

Charnockite plutons were intruded into Meso-Neoproterozoic (ca. 1000 Ma) high-grade metamorphic zone in the northern Prince Charles Mountains (PCM) immediately after peak granulite metamorphism in the region. Detailed geochemical and Sr-Nd isotopic studies were carried out on these plutons and related rocks, which enables important constraints to be placed on the regional tectonic setting as well as the origin of igneous charnockites. The authors consider that the PCM charnockites and related regional metamorphism resulted from Meso- to Neoproterozoic continental collision between Archaean and Palaeoproterozoic cratonic blocks in East Antarctica. The Meso-Neoproterozoic collision was probably a global event, possibly related to construction of the Rodinia Supercontinent. During this collisional period or earlier orogenic events in the region (e.g. arc-continent collision in the Palaeo-Mesoproterozoic), calcareous sediments, formed at plate margins or back-arc basins, would have been tectonically transported to depth. Release of CO<sub>2</sub>-rich fluids upon tectonic burial may have been responsible for amphibolite-to-granulite transition without causing dehydration melting to generate I-type granites. (Auth. mod.)

**E-57164**

McIntyre, L., Kaczmarek, I., **Improved resolution of the Pleistocene extinction level of *Stylatractus universus* Hays (Radiolaria) in ODP Hole 745B, Kerguelen Plateau**, *Micropaleontology*, Winter 1996, 42(4), p.375-379, Refs. p.377-378.



A combination of high resolution sampling and reevaluation of the "extinction" of the Pleistocene radiolarian, *Stylatractus universus* Hays, has resulted in precise placement of the .425 Ma datum at 24.8-24.4 mbsf in the siliceous sediment section recovered by ODP from Kerguelen Plateau Site 745. This reevaluation reconciles earlier differences between diatom and radiolarian stratigraphies of the Brunhes section of the sediments. (Auth.)

#### E-57165

Farquhar, J., Chacko, T., Ellis, D.J., **Preservation of oxygen isotope compositions in granulites from Northwestern Canada and Enderby Land, Antarctica: implications for high-temperature isotopic thermometry**, *Contributions to mineralogy and petrology*, Oct. 1996, 125(2-3), p.213-224, Refs. p.222-224.

The authors apply isotopic thermometry and data handling techniques to calculate and contrast mineral-pair apparent temperature data and observed closure temperature data for the very high temperature (>900°C), dry granulites of the Taltson Magmatic Zone of northwestern Canada and the Napier Complex of Enderby Land. Quartz-magnetite temperatures from the Napier complex are similar to those inferred for a late (D3) deformation and are lower than those predicted by "dry" diffusion data. The authors infer that the quartz-magnetite isotopic fractionations reflect deformation-enhanced exchange that accompanied D3. Garnet in these same samples did not undergo ductile deformation and did not exchange oxygen with coexisting phases during cooling. It is concluded that the resistance of garnet to ductile deformation in these rocks is a second reason why garnet is suitable for isotopic thermometry. (Auth. mod.)

#### E-57167

Pirrie, D., Crame, J.A., Lomas, S.A., Riding, J.B., **Late Cretaceous stratigraphy of the Admiralty Sound region, James Ross Basin, Antarctica**, *Cretaceous research*, Feb. 1997, 18(1), p.109-137, Refs. p.135-136.

Key exposures through the Late Cretaceous Marambio Group are located in the Admiralty Sound region. On southern James Ross I., an extensive sequence of bioturbated silty mudstones, muddy sandstones, fine-grained sandstones, ash layers and rare conglomerates has been subdivided into two component members of the Santa Marta Formation: the Rabot Member and the overlying, newly defined, Hamilton Point Member. Both members are fossiliferous, and have yielded a variety of both macro- and microbios indicating relatively shallow marine conditions. A combination of both ammonite and palynomorph evidence suggests that both the Rabot and Hamilton Point members are Early to Late Campanian in age. The Santa Marta Formation is believed to pass directly up into the newly defined Snow Hill Island Formation, which forms the majority of the exposure on Snow Hill I. and the south-westernmost tip of Seymour I. This unit comprises poorly lithified grey sandy mudstones, lithified fine-grained sandstones, and dark mudstones. The Snow Hill Island Formation is in turn unconformably overlain by the López de Bertodano Formation, which, as redefined herein, is restricted to the northern tip of Snow Hill I., Seymour I., and one small exposure on Vega I. The authors suggest that they can prove that the Campanian-Maastrichtian sequence is between 2500 and 2900 m thick and that this is one of the thickest onshore Late Cretaceous successions in the Southern Hemisphere. (Auth. mod.)

#### E-57204

Holmes, B., **Death knell for Martian life**, *New scientist*, Dec. 21-28, 1996, 152(2061-2), p.4, 1 ref.

In Aug., scientists led by NASA's David McKay stunned the world by producing evidence of past life on Mars. But now two new analyses could put the final nail on the coffin of that claim. The evidence for Martian life centers on the meteorite ALH84001, which chipped off the surface of Mars some 15 mya and landed in the Allan Hills region of Antarctica about 13,000 years ago. Fissures in the meteorite contain carbonate globules. Inside these are tiny tubular structures that look like fossilized bacteria. The globules also contain crystals of the minerals magnetite and iron sulphide that are similar to those produced by some terrestrial bacteria, and polycyclic aromatic hydrocarbons (PAHS), oily organic molecules often formed during the decomposition of living organisms, but it is suggested that nonbiological explanations may be more likely.

#### E-57209

Kellogg, T.B., Hughes, T., Kellogg, D.E., **Late Pleistocene interactions of East and West Antarctic ice-flow regimes: evidence from the McMurdo Ice Shelf**, *Journal of glaciology*, 1996, Vol.42, p.486-500, 58 refs.

The authors present new interpretations of deglaciation in McMurdo Sound and the western Ross Sea, with observationally based reconstructions of interactions between East and West Antarctic ice at the last glacial maximum (LGM), 16,000, 12,000, 8,000 and 4,000 BP. At the LGM, East Antarctic ice from Mulock Glacier split; one branch turned westward south of Ross I. but the other branch rounded Ross I. before flowing southwest into McMurdo Sound. After the LGM, grounding-line retreat was most rapid in areas with greatest water depth, especially along the Victoria Land coast. By 12,000 BP, the ice-flow regime in McMurdo Sound changed to through-flowing Mulock Glacier ice. The modern flow regime was established ca. 4,000 BP. Ice derived from high elevations on the Polar Plateau but now stranded on the McMurdo Ice Shelf, and the pattern of the Transantarctic Mountains erratics support reconstructions of Mulock Glacier ice rounding Minna Bluff but with all ice from Skelton Glacier ablating south of the bluff. Ice-sheet modeling holds promise for determining whether deglaciation proceeded by grounding-line retreat of an ice sheet that was largely stagnant, or of a dynamic ice sheet with flowline profiles kept low by active ice streams that extended northward from present-day outlet glaciers after the Ross Ice Shelf grounded. (Auth. mod.)

#### E-57243

Janecek, T.R., ed, **Descriptions of sediment recovered by the R/V Nathaniel B. Palmer, United States Antarctic Program, cruise 1, 1994**, *Florida State University. Antarctic Marine Geology Research Facility. Contribution*, Mar. 1997, No.5, 85p., Refs. p.75-79.

This volume contains the descriptions of sediments recovered by the R/V *Nathaniel B. Palmer* during cruise 1 in 1994 to the eastern, north-western, and central Ross Sea area (herein referred to as cruise NBP94-01). Over 4,100 km of high-resolution seismic data, 27 piston cores, 19 trigger cores, and 17 grab samples were collected during the cruise. Included are a summary of the scientific objectives and preliminary results of cruise NBP94-01, a table and map of station locations, a discussion of core processing, an explanation of laboratory descriptive procedures, lithologic and smear-slide descriptions of piston and trigger cores, and several appendices containing information on how to obtain samples from cores stored at the Antarctic Marine Geology Research Facility.

#### E-57255

Majoran, S., Widmark, J.G.V., Kucera, M., **Palaeoecological preferences and geographical distribution of Late Maas-trichtian deep-sea ostracods in the South Atlantic**, *Lethaia*, Mar. 1997, 30(1), p.53-64, Refs. p.63-64.

The distributional patterns of deep-sea ostracods in the terminal Cretaceous South Atlantic were examined from seven DSDP/ODP holes. Many of the genera recorded in this study are previously known from Campanian-Maastrichtian deep-sea sediments. However, the recovery of *Aversovalva*, *Hemiparacytheridea*, *Profundobrythere*, *Mayburya* and *Legitimocythere* reveals considerable similarities with the Tertiary deep-sea ostracod fauna of the Pacific and the North Atlantic. The underlying causes controlling the variation in faunal density among the various sites are likely to be related to variation in food supply and, to a lesser extent, to variation in oxygen levels. A Q-mode principal component analysis with varimax rotation yielded a first component largely dominated by *Brythocypris* and significantly correlated with paleotemperature. The second component is largely dominated by *Krithe* and significantly correlated with paleotemperature and paleodepth. Among the sites studied, *Krithe* is most common at Site 356, where the paleotemperature was around 15°C; today, most representatives of this genus are psychrospheric and adapted to temperatures below 10°C. (Auth. mod.)

#### E-57271

Burckle, L.H., Kellogg, D.E., Kellogg, T.B., Fastook, J.L., **Mechanism for emplacement and concentration of diatoms in glacial deposits**, *Boreas*, Mar. 1997, 26(1), p.55-60, 22



refs.

The occurrence of diatoms (both marine and freshwater) in sediments beneath the West Antarctic Ice Sheet (WAIS) is suggestive of past ice-sheet collapse. However, it is not the only model explaining such occurrences. The authors propose another mechanism for introducing diatoms beneath ice sheets by considering the fate of a diatom placed (by eolian processes) on top of an ice sheet. Mathematical modeling indicates that the route the diatom will take through the ice sheet is dictated by the basal melting rate. If no basal melting takes place, flowlines will crop out at the ice-sheet margin. However, if basal melting is as low as 0.01 m/yr the trajectories of all flowlines except for those nearest the margin will intersect the bed, with those diatoms deposited near the dome reaching the bed about halfway down the flowband. Larger values of basal melting lead to the diatoms reaching the bed even faster and closer to the point of origin. In light of these results, the presence of diatoms in sediments beneath the WAIS does not lead to a unique solution; it is not necessary to invoke past ice-sheet collapse to account for their presence. (Auth. mod.)

#### E-57277

Nagai, H., Honda, M., Imamura, M., Kobayashi, K., **Cosmogenic  $^{10}\text{Be}$  and  $^{26}\text{Al}$  in metal, carbon, and silicate of meteorites**, *Geochimica et cosmochimica acta*, 1993, Vol.57, p.3705-3723, Refs. p.3721-3722.

Cosmogenic nuclides  $^{10}\text{Be}$  and  $^{26}\text{Al}$  were determined in various meteorites, including antarctic chondrites, stony irons, and irons. In an effort to obtain information concerning shielding conditions for cosmic ray irradiation in meteorites, these two nuclides were measured in separated metal phases, where they are high-energy products, and in separated stone phases, where they are lower-energy products. Graphite phases, representing the single smallest mass target, were also separated from the IA group irons, and high production rate of  $^{10}\text{Be}$  was determined in carbon. Based on the data obtained in this work and the literature cited, shielding in meteorites, in general, is expressed quantitatively by two universal parameters, as follows:  $k_2$ , a measure of the irradiation hardness or the spectral shape of the flux; and  $k_1$ , a measure of the intensity of the irradiation. For chondrites, these parameters have been related numerically to the size of the preatmospheric body and the sample depth in it. (Auth. mod.)

#### E-57343

Stephenson, N.C.N., Cook, N.D.J., **Metamorphic evolution of calcsilicate granulites near Battye Glacier, northern Prince Charles Mountains, East Antarctica**, *Journal of metamorphic geology*, May 1997, 15(3), p.361-378, Refs. p.377-378.

Calcsilicate granulites of probable Middle Proterozoic age (c.1000-1100 Ma) in the vicinity of Battye Glacier contain prograde metamorphic assemblages comprising various combinations of wollastonite, scapolite, clinopyroxene, An-rich plagioclase, calcite, quartz, titanite and, rarely, orthoclase, ilmenite, phlogopite and graphite. Comparison of the prograde assemblages with calculated and experimentally determined phase relations in the simple  $\text{CaO-Al}_2\text{O}_3\text{-SiO}_2\text{-CO}_2\text{-H}_2\text{O}$  system suggests peak metamorphism at  $\geq 835^\circ\text{C}$  in the presence (in wollastonite-bearing assemblages at least) of a  $\text{CO}_2$ -bearing fluid ( $X_{\text{CO}_2} \geq 0.3$ ) at a probable pressure of 6-7 kbar. Well-preserved retrograde reaction textures are interpreted to be the result of cooling and variable infiltration by  $\text{H}_2\text{O}$ -rich fluids, possibly derived from crystallizing pegmatitic intrusions and segregations that may be partial melts, which are common throughout the area. (Auth. mod.)

#### E-57349

Appleby, P.G., Jones, V.J., Ellis-Evans, J.C., **Radiometric dating of lake sediments from Signy Island (maritime Antarctic): evidence of recent climatic change**, *Journal of paleolimnology*, Mar. 1995, 13(2), p.179-191, Refs. p.190-191.

Sediment cores from three lakes (Moss, Sombre and Heywood) on Signy I. have been successfully dated radiometrically by  $^{210}\text{Pb}$  and  $^{137}\text{Cs}$ . The core inventories of both fallout radionuclides are an order of magnitude higher than that which can be supported by the direct atmospheric flux at this latitude. The elevated values may be explained by fallout onto the catchment during the winter being delivered directly to the lakes during the annual thaw. Two of the lakes (Sombre and Hey-

wood) show marked increases in sediment accumulation after c.1950. This appears to be associated with a documented rise in temperature in the South Orkney Is., which has caused extensive deglaciation at Signy I. (Auth.)

#### E-57350

Björck, S., Håkansson, H., Olsson, S., Barnekow, L., Janssens, J., **Paleoclimatic studies in South Shetland Islands, Antarctica, based on numerous stratigraphic variables in lake sediments**, *Journal of paleolimnology*, 1993, 8(3), p.233-272, Refs. p.269-272.

The hitherto longest found lake sediment sequence on Byers Peninsula was analyzed with respect to lithology, chronology, diatoms, *Pediastrum*, pollen and spores, mosses, mineralogy, and sediment chemistry. The palaeoclimatic picture that emerged out of the tephra 'noise' suggests that the first 100 years were characterized by mild, humid conditions. This was followed by a less mild and humid climate until ca. 4000 BP, when a gradual warming seems to have started, coupled with increased humidity. These mild and humid conditions seem to have reached an optimum slightly after 3000 BP. At ca. 2500 BP a distinct climatic deterioration occurred with colder and drier conditions and long seasons with ice cover. This arid, cold phase probably reached its optimum conditions at ca. 1500 BP, when slightly warmer conditions might have prevailed for a while. Except for the modern sample with rather mild climate, the last 1400 years seem to have been fairly arid and cold, and the effects of the frequent volcanic activity during this period is only vaguely seen in the records. (Auth. mod.)

#### E-57358

Hammer, C.U., Clausen, H.B., Langway, C.C., Jr., **50,000 years of recorded global volcanism**, *Climatic change*, Jan. 1997, 35(1), p.1-15, 23 refs.

The 2191 m long ice core recovered at Byrd Station in 1968 was measured continuously by an electrical conductivity method (ECM). The ECM curve infers the acidity of seasonal ice layers and major peaks, which identify clearly intermediate and prominent past volcanic activity over the last 50,000 years. Also presented are recent data for a suite of the most striking volcanic events that occurred around  $17.5 \text{ ka} \pm 0.5 \text{ BP}$ . These events emitted enormous amounts of HCl and HF into the atmosphere. (Auth. mod.)

#### E-57360

Ibáñez, J.M., Morales, J., Alguacil, G., Almendros, J., Ortiz, R., Del Pezzo, E., **Intermediate-focus earthquakes under South Shetland Islands (Antarctica)**, *Geophysical research letters*, Mar. 1, 1997, 24(5), p.531-534, 11 refs.

This study is based on data from five field surveys (1992-96) of seismic monitoring on Deception I. (South Shetland Is.). In the 1994-95 and 1995-96 surveys earthquakes were recorded by a seismic array. The analysis of the events shows evidence of intermediate-focus seismicity ( $50 < H < 100 \text{ km}$ ) related to the underplating zone of the South Shetland plate. Poor station coverage dictated the use of unconventional techniques to locate the events that provide information about apparent velocity and back-azimuth, ray-tracing procedure and particle motion patterns. These criteria allowed identification of 15 earthquakes that could be considered as intermediate-focus events, for which some focal parameters were estimated. The subduction zone between the Drake plate and South Shetland microplate has a moderate level of intermediate-depth microseismicity. (Auth. mod.)

#### E-57383

Evans, J.M., Stone, J.O.H., Fifield, L.K., Cresswell, R.G., **Cosmogenic chlorine-36 production in K-feldspar**, *Nuclear instruments and methods in physics research B*, Mar. 1997, 123(1-4), International Conference on Accelerator Mass Spectrometry (AMS-7), Tucson, AZ, May 20-24, 1996. Proceedings, p.334-340, 18 refs.

The high production rate of *in-situ* cosmogenic  $^{36}\text{Cl}$  from potassium allows K-rich minerals to be dated with high sensitivity and precision. K-rich minerals, such as K-feldspar and biotite are commonly associated with quartz in which  $^{36}\text{Al}$  and  $^{10}\text{Be}$  are produced, allowing 3 cosmogenic nuclides, with half-lives ranging from 0.3 Ma to 1.5 Ma, to be measured



in a single sample. To calibrate the production rate of  $^{36}\text{Cl}$  from potassium, the authors have measured K-feldspar samples from ice-scoured bedrock from 3 separate sites, covering a range of altitudes, latitudes and exposure ages. The results from each site are internally consistent, with 8 glacial pavements from the Sierra Nevada, 3 Scottish glacial pavement samples, and 2 antarctic bedrock samples. Normalizing these production rates to sea level and high latitude, results from the Sierra Nevada and Scotland are found to be in good agreement with each other, but the production rate derived from the antarctic samples is found to be approximately 35% higher. Repeat measurements and stepwise dissolution indicate that the high  $^{36}\text{Cl}$  concentration of the antarctic samples is real and cannot be attributed to meteoric  $^{36}\text{Cl}$ . (Auth. mod.)

#### E-57393

Cartwright, I., Buick, I.S., Harley, S.L., **Timing and mechanisms of carbon isotope exchange in granulite-facies calc-silicate boudins, Rauer Group, East Antarctica**, *American mineralogist*, Mar.-Apr. 1997, 82(3-4), p.392-404, Refs. p.403-404.

Mineralogically zoned, decimeter-diameter calc-silicate boudins enclosed within paragneisses from Little Italy I. Rauer Group, underwent granulite-facies metamorphism followed by near-isothermal decompression to 200-400 MPa. During decompression several mineral reactions occurred in the presence of a pore fluid. The calc-silicate boudins show a general increase in calcite  $\delta^{13}\text{C}$  values from core to rim; by contrast,  $\delta^{18}\text{O}$  values show little variation across the boudins. The  $\delta^{13}\text{C}$  profiles are similar to those predicted to result from diffusion within a sphere that is surrounded by a homogeneous reservoir. Diffusion of carbon isotopes probably occurred synchronous with the post-peak metamorphic mineral reactions. The calculated timescales may reflect the time over which metamorphic recrystallization occurred and a reaction-enhanced porosity was present. Graphite formed locally in the paragneisses only at margins of the boudins probably reflects the local escape of  $\text{CO}_2$ -bearing fluids from the boudins into relatively low  $f_{\text{O}_2}$  rocks. (Auth. mod.)

#### E-57394

Galli, E., Quartieri, S., Vezzalini, G., Alberti, A., Franzini, M., **Terranovaite from Antarctica: A new 'pentasil' zeolite**, *American mineralogist*, Mar.-Apr. 1997, 82(3-4), p.423-429, 21 refs.

A new high-silica zeolite, terranovaite, was recently found in cavities of Ferrar dolerites in northern Victoria Land. The mineral occurs as globular masses that flake off in transparent lamellae; it has a vitreous luster, white streak, perfect cleavage, and distinct parting. The observed density is  $2.13 \pm 0.02 \text{ g/cm}^3$ . Optically, it is biaxial positive. The orientation is  $X=c$ ,  $Y=a$ , and  $Z=b$ . Terranovaite is orthorhombic with  $a=9.747(1)$ ,  $b=23.880(2)$ ,  $c=20.068(2)$  Å and topological symmetry  $Cmcm$ . Terranovaite topology, hitherto unknown in either natural or synthetic zeolites, is characterized by the presence of pentasil chains and a two-dimensional ten-membered ring channel system. The mineral was named terranovaite after the Italian antarctic station at Terra Nova Bay. (Auth. mod.)

#### E-57432

Crame, J.A., Luther, A., **Last inoceramid bivalves in Antarctica**, *Cretaceous research*, Apr. 1997, 18(2), p.179-195, Refs. p.194-195.

The last inoceramid bivalves in Antarctica are no younger than mid-to late Campanian in age. They occur within the Herbert Sound and Rabot Point members of the Santa Marta Formation, which is the lowermost of 4 component formations within the Late Cretaceous-earliest Tertiary Marambio Group, James Ross Basin. These inoceramids comprise an unusual giant form which is assigned herein to *Antarcticeramus rabotensis* gen. et sp. nov. Moderately inequivalve and gryphaeoid in form, *Antarcticeramus* is characterized by a larger and more inflated right valve with a rounded-trapeziform to obliquely elongated outline. *A. rabotensis* gen. sp. nov. is extremely abundant at certain levels within the Rabot Point Member. It is postulated that the evolution of giant size was primarily an antipredatory device. However, just as large, benthic predators were radiating in the latest Cretaceous, seawater temperatures in the

southern high latitudes were beginning to fall. In the end, secretion of such large calcitic shells may have become physiologically impractical. (Auth. mod.)

#### E-57434

Zhang, Y., Sears, D.W.G., **Thermometry of enstatite chondrites: A brief review and update**, *Meteoritics and planetary science*, Sep. 1996, 31(5), p.647-655, Refs. p.654-655.

Due to the discoveries in Antarctica, the number of known enstatite chondrites has doubled in the last few years, and many rare or previously unknown types have been collected, most notably many EL3 and EH3 chondrites. The authors have applied the 5 major enstatite chondrite thermometers to the new and previously known enstatite chondrites: kamacite-quartz-enstatite-oldhamite-troilite (KQEOT), oldhamite, alabandite-niningerite, sphalerite, and phosphide-metal. Measured temperatures based on the KQEOT and oldhamite systems are  $800^\circ\text{--}1000^\circ\text{C}$  with the type 3 enstatite chondrites having values similar to those of type 4-6. It seems likely that these temperatures relate to events prior to parent body metamorphism, such as nebula condensation or chondrule formation, and were not significantly reset by later events. Measured temperatures for alabandite-niningerite, metal-phosphide and sphalerite in EH chondrites increase from  $300^\circ\text{--}400^\circ\text{C}$  to  $600^\circ\text{--}800^\circ\text{C}$  with petrographic indications of increasing metamorphism. In contrast, measured temperatures for all EL chondrites, including the most heavily metamorphosed, are generally  $<400^\circ\text{C}$ . (Auth. mod.)

#### E-57448

Zhivago, A.V., **Bottom topography of the South Atlantic Ocean and the Scotia Sea** [Morfostruktura dna iugo-zapadnoi Atlantiki i moria Skotii], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1990, Vol.126, p.137-171, In Russian with English summary. Refs. p.169-171.

DLC GC1.A4T.126 1990

Investigations carried out during cruises of the r/v *Akademik Kurchatov* (1985) and the r/v *Dmitri Mendeleev* (1989) permitted to reveal principal geomorphological properties of the South-Antillean basin, its bordering ridges and the Mid-Scotia Ridge. One ridge of mid-oceanic type was created in eastern Scotia Sea about 7 m.y.a. (Late Miocene). Some new transform faults were discovered. A new morphostructural map of South Atlantic Ocean and Scotia Sea was compiled. The opening of the Scotia Sea (South-Antillean basin) had taken place 30-31 m.y.a.; the Drake Passage 20-23 m.y. At the same time the Antarctic Circumpolar Current—the dominant feature of the southern ocean circulation—was formed. (Auth. mod.)

#### E-57449

Levitan, M.A., Dietrich, P.G., **Bottom sediment facial variability north of Elephant I.** [Fatsial'naia izmenchivost' donnykh osadkov k severu ot o-va Mordvinova (Elefant) (Iuzhnye Shetlandskie ostrova)], *Akademiia Nauk SSSR. Institut Okeanologii. Trudy*, 1990, Vol.126, p.185-192, In Russian with English summary. 3 refs.

DLC GC1.A4T.126 1990

Complex lithological-geochemical studies of bottom sediments were carried out in the southern part of the Scotia Sea. The authors suggest they have established the dominant role of the bottom topography of Elephant I., and the distance from the coast line, on the facial variability of bottom sediments in the conditions of the marine-glacial sedimentogenesis. (Auth. mod.)

#### E-57468

Misawa, K., Fujita, T., **Relict refractory inclusion in a ferromagnesian chondrule from the Allende meteorite**, *Nature*, Apr. 1994, 368(6473), p.723-726, 28 refs.

Carbonaceous chondrites such as the Allende meteorite are composed of abundant ferromagnesian chondrules and (Ca, Al)-rich inclusions (CAIs) embedded in a fine-grained matrix. The chondrules were formed by melting of pre-existing solid precursor materials, whereas CAIs formed either by direct condensation from the nebular gas or by high-temperature processing of solids in the nebula. These two components usually appear as discrete objects in chondrites, and are believed to



have formed independently before agglomeration of the chondrite parent bodies. However, elemental analyses of some Al-rich chondrules suggest that there was a refractory component—such as CAIs—in the chondrule precursor material. The authors report here the discovery of a ferromagnesian chondrule from the Allende meteorite that contains an intact CAI fragment. This finding confirms that some CAIs coexisted with the precursor material of ferromagnesian chondrules, and helps to constrain the timing of the formation events of these two components. (Auth.)

#### E-57480

Fitzgerald, P.G., Stump, E., **Cretaceous and Cenozoic episodic denudation of the Transantarctic Mountains, Antarctica: New constraints from apatite fission track thermochronology in the Scott Glacier region**, *Journal of geophysical research*, Apr. 10, 1997, 102(B4), p.7747-7765, Refs. p.7763-7765.

Apatite fission track thermochronology utilizing vertical sampling profiles, with results interpreted using the concept of exhumed partial annealing zones, is applied in the Scott Glacier area of the Transantarctic Mountains (TAM). Patterns in age profiles indicate that episodes of denudation in the Early Cretaceous, Late Cretaceous, and Cenozoic were separated by periods of relative tectonic stability. Thermal modeling of time-temperature histories compared to observed data indicates that denudation episodes commenced at ca. 125 Ma, ca. 95 Ma, and 50-45 Ma. Magnitude of denudation is constrained only as >700 m for the Early Cretaceous and from barely detectable to 1.5 km for the Late Cretaceous. Since the Early Cenozoic, denudation within the TAM Front was similar in magnitude to other localities along the TAM (4-6 km), decreasing inland. Rock uplift was also a maximum at the coast, decreasing inland. The 3 denudation episodes correspond to regional tectonic events: Early Cretaceous southward translation of the Ellsworth-Whitmore Mountains block of West Antarctica relative to East Antarctica; Late Cretaceous extension in the Ross Embayment between East and West Antarctica; and Cenozoic rejuvenated faulting, magmatism, and deformation within the Victoria Land Basin and its presumed southward extension under the Ross Ice Sheet. (Auth. mod.)

#### E-57481

Gose, W.A., Helper, M.A., Connelly, J.N., Hutson, F.E., Dalziel, I.W.D., **Paleomagnetic data and U-Pb isotopic age determinations from Coats Land, Antarctica: Implications for late Proterozoic plate reconstructions**, *Journal of geophysical research*, Apr. 10, 1997, 102(B4), p.7887-7902, Refs. p.7900-7902.

Paleomagnetic results and isotopic age determinations for granophyre and rhyolite from small, isolated nunataks in southern Coats Land are used to evaluate late Proterozoic plate reconstructions. U-Pb zircon dates for the 2 rock types indicate coeval crystallization at  $1112 \pm 4$  Ma. A concordant  $1106 \pm 3$  Ma titanite date from the granophyre overlaps the crystallization age, implying rapid cooling, and is consistent with field and petrographic evidence of no subsequent penetrative deformation, metamorphism, or hydrothermal disturbance. The mean direction of magnetization of the rhyolite at Littlewood Nunataks is statistically indistinguishable from the mean directions of 5 sites in the granophyre and crosscutting rhyolite dikes at Bertrab Nunataks. The group mean virtual geomagnetic pole of  $22.9^\circ\text{N}$ ,  $80.3^\circ\text{E}$  ( $N=6$ ,  $A_{95}=6.8^\circ$ ) compares favorably with the only other extant Precambrian paleomagnetic poles for the East Antarctic craton, two poles from western Queen Maud Land. The East Antarctic and Laurentian poles of 1.1 Ga do not coincide after restoration of the continents to a position suggested by the SWEAT hypothesis juxtaposing the Pacific margins of East Antarctica-Australia and Laurentia, indicating either that the hypothesis is incorrect or that Coats Land and parts of western Queen Maud Land were not part of the East Antarctic craton at 1.1 Ga. (Auth. mod.)

#### E-57482

LaBrecque, J.L., Ghidella, M.E., **Bathymetry, depth to magnetic basement, and sediment thickness estimates from aerogeophysical data over the western Weddell Basin**, *Journal of geophysical research*, Apr. 10, 1997, 102(B4), p.7929-7945, Refs. p.7944-7945.

The authors estimated the bathymetry and sediment thickness of a remote and difficult to access portion of the antarctic continental margin using aerogeophysical surveying techniques. Magnetic and gravity data were collected over the basins surrounding the Antarctic Peninsula. Bathymetric estimates and depth to magnetic basement estimates were differenced at each grid point to obtain a regional estimate of the thickness of nonmagnetic overburden (assumed to be sediment). Subsequent spot measurements of topography in the estimated region of the continental margin generally agree to about 52 m. The estimated magnetic basement deepens from the Antarctic Peninsula margin eastward to a maximum of 10-12 km near  $54^\circ\text{W}$ . The authors also postulate the existence of two moderately large basins flanking the eastward continuation of the Jason Peninsula. Farther east, the basement steps upward, with a correspondent thinning of the sedimentary layer. It is concluded that this study further demonstrates the utility of combined application of airborne and satellite geophysical techniques in the study of structure and tectonic evolution of continental margins and marine basins. (Auth. mod.)

#### E-57491

Krot, A.N., Zolensky, M.E., Wasson, J.T., Scott, E.R.D., Keil, K., Ohsumi, K., **Carbide-magnetite assemblages in type-3 ordinary chondrites**, *Geochimica et cosmochimica acta*, Jan. 1997, 61(1), p.219-237, 33 refs.

Abundant carbide-magnetite assemblages occur in matrix, chondrules, and chondrule rims in several H3, L3, and LL3 chondrites. Carbides, cohenite  $((\text{Fe,Ni})_3\text{C})$ , and haxonite  $((\text{Fe,Ni})_{23}\text{C}_6)$  show compositional variations between different meteorites and appreciable ranges within meteorites. Carbides in H chondrites have lower Co contents (0-0.6 wt%) than those in L and LL chondrites (0.3-1.2 wt%). Metal associated with carbides and magnetite consists of high-Ni (50-70 wt%) taenite and, in L and LL chondrites, Co-rich (up to 35 wt%) kamacite; minor element contents of troilite and magnetite are very low. Textural observations indicate that carbide-magnetite assemblages formed by replacement of metal-sulfide nodules. The high Co contents of residual kamacite in association with carbides indicates that Co is not incorporated into carbides (i.e., Fe/Co is much higher in the carbides than in kamacite). Because Ni in carbides and magnetite is low, the Ni contents of residual taenite tend to be high. Ni-rich sulfides were found only in LL3 chondrites, possibly indicating their more extensive oxidation and/or aqueous alteration. It is suggested that carbide-magnetite assemblages in type-3 ordinary chondrites formed as the result of hydrothermal alteration of metallic Fe in metal-troilite nodules by a C-O-H-bearing fluid on their parent bodies. The chondrites examined in this study were those found in the Allan Hills, Lewis Cliff, and Elephant Moraine. (Auth. mod.)

#### E-57492

Weigel, A., Eugster, O., Koeberl, C., Krähenbühl, U., **Differentiated achondrites Asuka 881371, an angrite, and Divnoe: Noble gases, ages, chemical composition, and relation to other meteorites**, *Geochimica et cosmochimica acta*, Jan. 1997, 61(1), p.239-248, 52 refs.

A study is presented of the noble gas isotopic abundances in the two achondrites Divnoe and Asuka 881371 angrite. For Divnoe, chemical analyses were made of the major elements and some minor and trace elements relevant for comparison with other meteorite types and for the interpretation of noble gas data. An exposure age between 6.1 and 4.7 Ma was obtained for Asuka 881371. This ejection time differs from that of the angrites Angra dos Rios, LEW 86010, and LEW 87051. Isotopic details describing these differences are provided. For Divnoe, abundance patterns of major elements and isotopic analyses indicate that this unique meteorite is related to the barchinite achondrites. Its ejection event occurred 17.2 Ma ago. (Auth. mod.)

#### E-57501

Larson, K.M., Freymueller, J.T., Philipsen, S., **Global plate velocities from the Global Positioning System**, *Journal of geophysical research*, May 10, 1997, 102(B5), p.9961-9981, Refs. p.9980-9981.



The authors have analyzed 204 days of Global Positioning System (GPS) data from the global GPS network spanning Jan. 1991 through Mar. 1996. On the basis of these GPS coordinate solutions, they have estimated velocities for 38 sites, mostly located on the interiors of the Africa, Antarctica, Australia, Eurasia, Nazca, North America, Pacific, and South America plates. For most of the sites in North America, Antarctica, and Eurasia, the agreement is better than 2 mm/yr. The authors find no persuasive evidence for significant vertical motions ( $<3$  standard deviations), except at 4 sites. Three of these 4 were sites constrained to geodetic reference frame velocities. (Auth. mod.)

#### E-57507

Mahood, A.D., Barron, J.A., **Late Pliocene diatoms in a diatomite from Prydz Bay, East Antarctica**, *Micropaleontology*, Fall 1996, 42(3), p.285-302, Refs. p.298-302.

Very well-preserved Pliocene diatoms from a diatomite unit interbedded within glacial sediments at Ocean Drilling Program Site 742 in Prydz Bay are documented and illustrated. The presence of *Thalassiosira kolbei*, *T. torokina*, *Actinocyclus actinochilus*, *A. karstenii* and the absence of *Nitzschia interfrigidaria*, *T. insigna* and *T. vulnifica* in Sample 119-742A-15R-4, 44-46 cm constrain its age to ca. 2.2-1.8 Ma (Late Pliocene). Diatoms associated with sea ice constitute 35% of the Pliocene diatom assemblage, compared with 71% of the modern sediment assemblage at the site, suggesting that sea ice was present during the Late Pliocene period of deposition of the sample, although it probably was not the significant feature it is today. *Thalassiosira ellitipora* (Donahue) Fenner is described and illustrated in detail. An expanded description and numerous illustrations are also presented for *T. torokina* Brady. (Auth.)

#### E-57508

Keller, N.B., Pasternak, F.A., **Continental influence on deep-water coral formation in the Antarctic** [Vliianie Antarktidy na formirovanie fauny glubokovodnykh korall'ov], *Doklady Akademii nauk*, Apr. 1996, 347(4), p.506-508, In Russian. 12 refs.

A study is reported on the formation, biological characteristics and vertical distribution of several species of coral from different oceanic abysses and the antarctic continental shelf. *Caryophyllia antarctica*, *Gardineria antarctica*, *Flabellum impensum*, *F. flexuosum* and *Yavania antarctica* are discussed.

#### E-57516

Guglielmin, M., Biasini, A., Smiraglia, C., **Contribution of geoelectrical investigations in the analysis of periglacial and glacial landforms in ice free areas of the Northern Foothills (Northern Victoria Land, Antarctica)**, *Geografiska annaler*, 1997, 79A(1-2), p.17-24, 14 refs.

All periglacial and glacial landforms investigated in the Northern Foothills, Northern Victoria Land, have a very thin active layer overlying a thin permafrost layer, characterized by electrical resistivities ranging between 13 and 50 k $\Omega$ m and by different thicknesses. Below this surficial layer, different types of ground ice were detected. These different types of ground ice permitted ice-cored rock glaciers to be distinguished from ice-cemented rock glaciers, subsea permafrost to be identified in some raised beaches, and other interpretations to be suggested about a debris-covered glacier. These results have been obtained by vertical electrical soundings (VES) carried out in ice-free areas of the Northern Foothills, near Terra Nova Bay Station during the tenth national Italian expedition in Antarctica (1994-95). Electrical prospection can be considered a good means for understanding the origins of landforms in ice-free areas of Antarctica and for making a contribution to the palaeoenvironmental reconstruction of this continent. (Auth. mod.)

#### E-57518

Fleming, T.H., Heimann, A., Foland, K.A., Elliot, D.H., <sup>40</sup>Ar/<sup>39</sup>Ar geochronology of Ferrar Dolerite sills from the Transantarctic Mountains, Antarctica: implications for the age and origin of the Ferrar magmatic province, *Geological Society of America. Bulletin*, May 1997, 109(5), p.533-546, Refs. p.545-546.

The Ferrar Dolerite constitutes the hypabyssal phase of the tholeiitic Ferrar Group of Antarctica. The duration of magmatic activity was less than  $\approx 1$  m.y. By extension, other rocks in the Ferrar magmatic province, which occur from southeastern Australia, along the Transantarctic Mountains to the Theron Mountains, are inferred to have this age. The short duration of magmatic activity as well as the consistent pattern of geochemical variation and distinctiveness of the Ferrar rocks suggest that magmas were transported laterally by an extensive dike swarm which is inferred to have originated in the Weddell Sea sector of the province. (Auth. mod.)

#### E-57519

McLoughlin, S., Drinnan, A.N., **Revised stratigraphy of the Permian Bainmedart Coal Measures, northern Prince Charles Mountains, East Antarctica**, *Geological magazine*, May 1997, 134(3), p.335-353, 40 refs.

The Bainmedart Coal Measures constitute the middle portion of the Permian-Triassic Amery Group, which represents the only substantial Palaeozoic-Mesozoic sedimentary succession exposed in East Antarctica outside the Transantarctic Mountains. Both climatic and local tectonic factors are considered to have been the major influences on the pattern of coal measure sedimentation. Recent mapping has identified a much greater thickness of sediments within the coal measures than had been inferred previously. (Auth. mod.)

#### E-57535

Birkenmajer, K., **Mesozoic-Cenozoic magmatic arcs of northern Antarctic Peninsula: subduction, rifting and structural evolution**, Magmatism in relation to diverse tectonic settings. Edited by S.K. Srivastava and R. Chandra, New Delhi, Oxford and IBH Publishing Co. Pvt. Ltd., 1995, p.329-344, Refs. p.341-344.

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Two magmatic arcs occur in the area of the northern Antarctic Peninsula: an inner one represented by the northern Antarctic Peninsula and an outer one represented by the South Shetland Is. and Palmer Archipelago. These arcs formed as a response to SE Pacific oceanic crust subduction under the continental crust wedge of West Antarctica which, during the Jurassic and Cretaceous, represented the active Pacific margin of Gondwanaland. The magmatic centers apparently migrated over time from the Antarctic Peninsula north-westwards and north-eastwards as a result of shifting of the focus of subduction caused by rotation of the continental plate margin with respect to the SE Pacific plate and the presence of a fixed hot-spot-like structure within the mantle under the rotating antarctic plate margin. Rifting in Bransfield Strait, caused by continental crust spreading and mantle-derived basic magma intrusion has been in slow development since the Oligocene. (Auth. mod.)

#### E-57590

Birkenmajer, K., **Polish geological research on King George Island, West Antarctica (1977-1996)**, *Polish polar research*, Dec. 1996, 17(3-4), p.125-141, With Polish summary. Refs. p.134-140.

The Polish geological research on King George I. during the two past decades included: the establishment of formal lithostratigraphic standards for radiometrically-dated Upper Cretaceous through Tertiary magmatic rock sequences and intercalated sediments; the discovery of 4 Tertiary glaciations and 3 interglacials, spanning some 30 Ma from Early/Middle Eocene through Early Miocene; the discovery and systematic elaboration of rich terrestrial and marine biota of Late Cretaceous through Early Miocene ages; the reconstruction of changing Late Cretaceous and Tertiary terrestrial and marine palaeoenvironments in a mobile volcanic-arc setting; the determination of age and structural evolution of the island's 2 Quaternary volcanoes; and the reconstruction of the Late Cretaceous through Recent evolution stages of the South Shetland magmatic arc and its backarc Bransfield Basin and Rift, based on tectonic and structural studies. (Auth. mod.)

#### E-57617

Mac Cormack, W.P., Fraile, E.R., **Characterization of hydrocarbon degrading psychrotrophic Antarctic bacterium**, *Antarctic science*, June 1997, 9(2), p.150-155, 37 refs.



Antarctic soil chronically exposed to gas-oil was analyzed to isolate and study the growth conditions of hydrocarbon degrading bacteria. Soil samples taken near the shoreline at Jubany Station were used as inoculum in liquid culture media with crude oil as sole carbon source. A psychrotrophic *Acinetobacter* strain was isolated and selected for further investigations. Effects were studied of temperature, initial pH, NaCl concentration and different chemical structure of the hydrocarbon on growth. Degradation rate was determined with n-dodecane and n-hexadecane. Growth of *Acinetobacter* ADH-1 showed no differences at an initial pH of 7.0, 7.5 and 8.0. Optimum temperature ranged between 25-30°C. The study shows that *Acinetobacter* ADH-1 is a psychrotrophic bacteria able to grow with hydrocarbons as sole carbon and energy source and could be potentially useful to design bioremediation processes in temperate and cold climate areas. (Auth. mod.)

#### E-57620

Gràcia, E., Canals, M., Farràn, M., Sorribas, J., Pallàs, R., **Central and eastern Bransfield basins (Antarctica) from high-resolution swath-bathymetry data**, *Antarctic science*, June 1997, 9(2), p.168-180, Refs. p.178-180.

For the first time complete swath bathymetric maps of central and eastern Bransfield basins are presented at a medium scale; detailed morphological descriptions are provided. Bathymetry reveals morphological structures which provide important information about the structure, volcanism, and kinematics of these basins. The central basin is dominated by two roughly orthogonal sets of extensional faults (N065° the main set and N145° the secondary set), displays several discontinuous along-axis large volcanic cones and ridges trending about N053° and N103°, displays four deep troughs and a much smaller amount of volcanism than the central basin, and is affected by extension with a significant sinistral strike-slip component. (Auth.)

#### E-57621

Hall, K., **Observations on "cryoplanation" benches in Antarctica**, *Antarctic science*, June 1997, 9(2), p.181-187, Refs. p.186-187.

A series of benches on nunataks of Alexander I. are described. An increase in bench size with distance away from the retreating glacier suggests an age spectrum. The benches have thermal contraction cracks (in bedrock) on shallower, upper sections of the risers as well as salt encrusted runnels on the steeper lower section of the tread. The benches also show a distinct orientational preference (oriented to the north through to west) and, from first principles, these seem to be the aspects with optimal freeze-thaw cycles and temperatures conducive to thermal stress fatigue. The extensive dilatation associated with the retreating glaciers is thought to play a significant role in the origin and development of the benches as the combination of extensive jointing, and optimal process conditions are thought to constrain where benches begin. The jointing, aided by the thermal contraction cracking, then facilitates extension and continued weathering of the treads. (Auth. mod.)

#### E-57624

McCarron, J.J., **Unifying lithostratigraphy of late Cretaceous-early Tertiary fore-arc volcanic sequences on Alexander Island, Antarctica**, *Antarctic science*, June 1997, 9(2), p.209-220, Refs. p.219-220.

Late Cretaceous-early Tertiary subduction-related fore-arc volcanic rocks are exposed in a north-south linear belt along the length of Alexander I. They are not considered to represent "normal" arc magmas but were generated in the fore-arc as a result of ridge subduction. Due to their distinct composition and mode of formation, they are no longer considered to be genetically related to the Antarctic Peninsula magmatic arc. They are therefore removed from the Antarctic Peninsula Volcanic Group and placed in a newly defined Alexander I. Volcanic Group. The group is made up of the Monteverdi, Staccato, Walton, Colbert, Elgar and Finlandia formations, which vary widely in lithology, facies and age. The Colbert and Elgar formations are subdivided into 9 and 3 members, respectively. Type localities, representative lithologies and age of each of the formations are discussed. (Auth. mod.)

#### E-57641

Gasparini, Z., Pereda-Suberbiola, X., Molnar, R.E., **New data**

**on the ankylosaurian dinosaur from the Late Cretaceous of the Antarctic Peninsula**, *Queensland Museum. Memoirs*, Dec. 20, 1996, 39(3), Gondwanan Dinosaur Symposium. Proceedings, edited by F.A. Novas and R.E. Molnar, p.583-594, Refs. p.592-594.

Ankylosaurian remains have been found in the Late Cretaceous of the Antarctic Peninsula. The material includes a lower jaw, teeth, cervical, dorsal, sacral? and caudal vertebrae, ribs, parts of the scapula and ilium, autopodial bones, and armour from a single small individual. The antarctic ankylosaur is probably a nodosaurid, based on the tooth form. The fragmentary material doesn't permit accurate identification at the generic or specific levels, so the specimens are referred to Nodosauridae indet. Current data on ankylosaurian distribution supports the hypothesis of a late dispersal of nodosaurids from the Northern Hemisphere to the Antarctic Peninsula via South America, although an early migration during Late Jurassic or Early Cretaceous time is possible. The antarctic ankylosaur was small and lived in a high-latitude, although rather mild climate. (Auth.)

#### E-57642

Molnar, R.E., López Angríman, A., Gasparini, Z., **Antarctic Cretaceous theropod**, *Queensland Museum. Memoirs*, Dec. 20, 1996, 39(3), Gondwanan Dinosaur Symposium. Proceedings, edited by F.A. Novas and R.E. Molnar, p.669-674, Refs. p.673-674.

The distal part of a theropod tibia has been recovered from the Coniacian-Santonian Hidden Lake Fm. near Cape Lachmann, James Ross I. The piece closely resembles the corresponding region in *Megalosaurus* and, more closely, in *Piatnitzkysaurus*. This suggests that a persistently plesiomorphic tetanuran lineage inhabited the Antarctic. The relatively small size of the animal argues against a mean annual temperature below 15°C in its environment. (Auth.)

#### E-57643

Rich, T.H., **Significance of polar dinosaurs in Gondwana**, *Queensland Museum. Memoirs*, Dec. 20, 1996, 39(3), Gondwanan Dinosaur Symposium. Proceedings, edited by F.A. Novas and R.E. Molnar, p.711-717, Refs. p.716-717.

Polar dinosaurs have been found at 4 localities in the Southern Hemisphere and 8 in the Northern Hemisphere. Three groups of dinosaurs, neoceratopsians, ornithomimosaur and oviraptorosaurs, previously known only from the Late Cretaceous of the Northern Hemisphere were present in the Early Cretaceous polar dinosaur fauna of southeastern Australia. Labyrinthodont amphibians were also represented, but do not occur in the same deposits as crocodilians. Enlarged optic lobes of the hypsilophodontid *Leaellynasaura*, suggesting enhanced ability to see under low light conditions, is the only adaptation to a polar environment yet recognized in a dinosaur. Polar dinosaurian taxa are not unique at the familial level, but belong to more widespread families. Polar dinosaurs probably lived under cold climates quite unlike those tolerated by modern reptiles. (Auth.)

#### E-57655

Gohl, K., Nitsche, F., Miller, H., **Seismic and gravity data reveal Tertiary interplate subduction in the Bellingshausen Sea, southeast Pacific**, *Geology*, Apr. 1997, 25(4), p.371-374, 19 refs.

Satellite gravity data reveal extraordinary lineations in the gravity field of the western Bellingshausen Sea. Major north-south-striking gravity anomalies west of Peter I I. and between the island and the De Gerlache Seamounts raise questions of the deep crustal structure and tectonic events in that part of the antarctic plate. In 1994 and 1995, the authors acquired multichannel seismic records and shipborne gravity data across the gravity anomalies which show strong evidence for a converging event within the oceanic crust, including a subducted crustal segment and possibly accreted sediments on top of the downgoing basement. West and east of the basement step and diffraction zone, the seismic sections indicate normally developed oceanic crust with moderate basement undulations. The sequence of undisturbed sediments on top of the compressional structure suggests a tectonic event between 50



and 13 Ma, while relative motion between the Antarctic-Bellingshausen plate and the Phoenix plate had already begun in the Late Cretaceous. (Auth. mod.)

#### E-57662

Krause, W.E., Krbetschek, M.R., Stolz, W., **Dating of Quaternary lake sediments from the Schirmacher Oasis (East Antarctica) by infra-red stimulated luminescence (IRSL) detected at the wavelength of 560 nm**, *Quaternary geochronology*, Apr.-June 1997, 16(3-5), International Conference on Luminescence and Electron Spin Resonance Dating, 8th, Canberra, Australia, Apr. 22-26, 1996. Proceedings, p.387-392, 17 refs.

Twelve samples from 3 antarctic lake cores were selected for dating by a method using infra-red stimulated luminescence. A spectral study of the luminescence signal from coarse grain plagioclase feldspars by a high sensitivity TL/OSL spectrometer using a CCD-camera showed four wavelength maxima, and the comparison of the equivalent doses ( $D_E$ ) measured at these wavelengths, namely 280, 330, 410 and 560 nm, yielded different values. The ages were calculated using  $D_E$  obtained at 560 nm. (Auth.)

#### E-57663

Santanach, P., Pallàs, R., Sàbat, F., Muñoz, J.A., **From small-scale faults to plate kinematics: palaeostress determinations in a fragmented arc complex (SE Livingston Island, S Shetland Islands, Antarctica)**, *Journal of the Geological Society*, London, Nov. 1996, 155(6), p.1011-1020, 51 refs.

Analysis of the polyphase fault population of southeastern Livingston I. showed 3 brittle deformation phases characterized by homaxial stress tensors. One of the horizontal axes trends NW-SE, parallel to the transform faults governing the relative movement between the Phoenix and antarctic plates. These tensors are interpreted as corresponding to the regional stress field, and the transition between the phases is seen as reflecting changes in the relative values of the principal axes of their corresponding stress tensors. Phases 1 and 2 correspond to strike slip regimes, the first having NW-SE-oriented  $\sigma_1$  (maximum principal compressive stress), whereas  $\sigma_1$  of phase 2 has a NE-SW trend. Phases 2 and 3 show a NW-SE-oriented  $\sigma_3$  (minimum principal compressive stress). The decreasing magnitude of the NW-SE stress axis during the recorded history is interpreted as being related to the decreasing velocities of the interacting plates caused by the cessation of the accretion at the Antarctic-Phoenix Ridge. The kinematic evolution of the analyzed fault population can be understood assuming that faults form according to the Anderson model, that extensional dykes and veins form perpendicular to  $\sigma_3$ , and that fault slip on pre-existing fractures occurs parallel to the maximum shear stress direction on those planes. (Auth.)

#### E-57665

Fitzsimons, S.J., **Entrainment of glaciomarine sediments and formation of thrust-block moraines at the margin of Sørsdal Glacier, East Antarctica**, *Earth surface processes and landforms*, Feb. 1997, 22(2), p.175-187, 25 refs.

The morphology, sedimentology and structure of moraines at the margin of an outlet glacier in East Antarctica are described, and contemporary depositional processes in a marine inlet adjacent to the ice margin are examined. Results indicate that the principal moraines are thrust-block moraines produced by basal freezing and deformation of glaciomarine sediment as the outlet glacier expands into a marine inlet. Preservation of detailed glaciomarine sedimentary structures and beds of marine shells suggests that the sediment was frozen during entrainment, transportation and deposition. The presence of low-angle faults in the moraines shows that the moraines consist of an *en echelon* arrangement of thrust plates. The sedimentology, structure, thickness of the thrust plates, and inferred entrainment processes are consistent with Weertman's ice-debris accretion hypothesis for debris entrainment at the edge of cold ice sheets. A model of thrust-block moraine development produced by this study provides a framework for the interpretation of radiocarbon dates from marine macrofossils in the moraines. The model may also be useful in the interpretation of similar moraines in coastal East Antarctica oases and other polar marginal marine environments. (Auth.)

#### E-57674

Seitz, H.M., Keays, R.R., **Platinum Group Element segregation and mineralization in a Noritic Ring Complex formed from Proterozoic siliceous high magnesium basalt magmas in the Vestfold Hills, Antarctica**, *Journal of petrology*, June 1997, 38(6), p.703-725, Refs. p.723-725.

Siliceous High Magnesium Basalt (SHMB) magmas have been implied to play critical roles in the formation of platiniferous horizons in layered intrusions such as the Bushveld Complex, South Africa. However, their role in the formation of such complexes and particularly in the generation of the Cu-Ni-Platinum Group Element (PGE) sulphide mineralization has been deduced rather than proven. In this paper, the authors present an example of Cu-Ni-PGE sulphide mineralization which was unequivocally formed from SHMB magmas. This example is provided by the Noritic Ring Complex of the northern Vestfold Hills. The Noritic Ring Complex is co-magmatic with the early Proterozoic High Magnesium Tholeiite (HMT) dykes which were previously demonstrated to have formed from SHMB magmas. It is suggested that the SHMB magma which formed the Rubbly Norite lagged behind the rest of the SHMB magma and spent some time in a residence chamber below the Noritic Ring Complex in which it underwent cooling, assimilation of country rock fragments and extensive crystallization of orthopyroxene which accumulated along the floor of the temporary magma chamber. (Auth. mod.)

#### E-57683

Ebihara, M., Ozaki, H., Kato, F., Nakahara, H., **Determination of chlorine, bromine and iodine in rock samples by radiochemical neutron activation analysis**, *Journal of radioanalytical and nuclear chemistry*, Feb. 1997, 216(1), p.107-112, 14 refs.

Chlorine, bromine and iodine (hereafter, halogens) were determined for rock samples by radiochemical neutron activation analysis. The powdered samples and reference standards prepared from chemical reagents were simultaneously irradiated for 10 to 30 minutes with or without a cadmium filter in a TRIGA-II reactor at the Institute for Atomic Energy, Rikkyo University. The samples were subjected to radiochemical procedures of halogens immediately after the irradiation. Iodine was firstly precipitated as  $PdI_2$ , and chlorine and bromine were successively precipitated as Ag-halides at the same time. In this study, geological standard rocks, sedimentary rocks and meteorites were analyzed for trace halogens. In some antarctic meteorites, iodine contents were observed to be anomalously high. Chlorine contents also are somewhat high. The overabundance of iodine and chlorine must be caused by terrestrial contamination in Antarctica. (Auth.)

#### E-57686

Retallack, G.J., **Early forest soils and their role in Devonian global change**, *Science*, Apr. 25, 1997, 276(5312), p.583-585, Numerous refs.

A paleosol in the Middle Devonian Aztec Siltstone of Victoria Land is the most ancient known soil of well-drained forest ecosystems. Clay enrichment and chemical weathering of subsurface horizons in this and other Devonian forested paleosols culminate a long-term increase initiated during the Silurian. From Silurian into Devonian time, red clayey calcareous paleosols show a greater volume of roots and a concomitant decline in the density in atmospheric carbon dioxide determined from isotopic records of pedogenic carbonate in these same paleosols. The drawdown of carbon dioxide began well before the Devonian appearance of coals, large logs, and diverse terrestrial plants and animals, and it did not correlate with temporal variation in volcanic or metamorphic activity. The early Paleozoic greenhouse may have been curbed by the evolution of rhizospheres with an increased ratio of primary to secondary production and by more effective silicate weathering during Silurian time. (Auth.)

#### E-57716

Mikhal'skiĭ, E.V., **Proterozoic mafic dykes of the Vestfold Hills [Proterozoiskie maficheskie daĭki oazisa Vestfoll' (Vostochnaia Antarktida)]**, *Antarktika*, 1995, No.33, p.19-36, In Russian with English summary. 17 refs.



The Vestfold Hills are made up of Archean metamorphic sequences intruded by over 500 basic dykes, some of which are up to 40 m thick. Dykes form swarms of subparallel bodies and the total dyke thickness can be as much as 10% of a swarm's width. Dykes with the same orientation are likely to have common mineral and chemical compositions. Dyke intersections show a number of magmatic events to have occurred. Ten dyke generations have been distinguished, each with characteristic orientation and composition. Most interesting are the high-Mg orthopyroxene-bearing basic rocks which are characteristic of at least three different generations, which suggests that magmatic evolution in this region may have been cyclical. High-Mg rocks are probably the intrusive counterparts of the boninite series thought to have been generated by a high degree of partial melting of depleted mantle sources. Geochemical data show that dolerites of other generations have been derived from enriched mantle sources similar to P-MORB or OIB. (Auth. mod.)

#### E-57717

Laiba, A.A., Kolobov, D.D., Pushina, Z.V., **Neogene glaciomarine deposits on the Fisher Massif** [Neogenovye gliatsial'no-morskoe otlozheniia na Massive Fisher (gory Prins-Charl'z, Vostochnaia Antarktida)], *Antarktika*, 1995, No.33, p.37-42, In Russian with English summary. 5 refs.

The authors describe an area of glaciomarine deposits in the Fisher Massif, the rhythmically stratified sections of which are made up of sorted and unsorted sediments containing both rounded and irregular-surface material. The total thickness of the deposits is 320 m, and they are situated 360 m above sea level and 280 m above the surface of the Lambert Glacier. In the base of the section there are traces of neogen diatom flora. (Auth. mod.)

#### E-57740

Munson, C.G., Bentley, C.R., **Crustal structure beneath Ice Stream C and Ridge BC, West Antarctica from seismic refraction and gravity measurements**, Recent progress in antarctic earth science. Edited by Y. Yoshida, Tokyo, Japan, Terra Scientific Publishing Company, 1992, p.507-514, 19 refs.

A 1988 seismic refraction/wide-angle reflection and gravity profile was oriented transverse to the axis of the ice stream C and extended 63 km across the stream to ridge BC in West Antarctica. The refraction and wide-angle reflection data were modeled using a two-dimensional ray trace forward modeling program to match travel times of refracted and reflected arrivals. Forward modeling of the gravity data was used to further define the structural model where seismic ray coverage was inadequate. These data constrain the velocity structure of the upper and middle crust and provide evidence for a low-velocity zone beneath the ice that varies in thickness from 100 m to 2.5 km within an apparent graben beneath ridge BC. Other major features of the structural model are: weak to moderate lateral variations in crustal structure, a basement crustal velocity that varies from 5.65 to 5.90 km/s, a sub-basement crustal velocity of 6.85 km/s at a relatively shallow depth (5-7 km), and a reflective zone (12- to 14-km depth) that may indicate mafic underplating. (Auth.)

#### E-57742

Scott, E.R.D., Yamaguchi, A., Krot, A.N., **Petrological evidence for shock melting of carbonates in the Martian meteorite ALH84001**, *Nature*, May 22, 1997, 387(6631), p.377-379, 30 refs.

Reported here are petrological studies of ALH84001 which investigate the effects of shock on the various mineralogical components of the rock. The authors find that carbonate, plagioclase and silica were melted and partly redistributed by the same shock event responsible for the intense local crushing of pyroxene in the meteorite. Texture and compositional data show that, during the period of shock decompression, monomineralic melts were injected into pyroxene fractures that were subsequently cooled and resealed within seconds. The results suggest that the carbonates in ALH84001 could not have formed at low temperatures, but instead crystallized from shock-melted material; this conclusion weakens significantly the arguments that these carbonates could host the fossilized remnants of biogenic activity. (Auth. mod.)

#### E-57743

Berger, W.H., **Algorithm for reconstruction of atmospheric CO<sub>2</sub> from deepsea sediments**, *Naturwissenschaften*, Nov. 1996, 83(11), p.519-522, 27 refs.

It is suggested that CO<sub>2</sub> reconstruction can be largely divorced from physical theory, and that a global signal—the oxygen isotope record representing ice mass variation and hence sea level fluctuation—is adequate for reconstruction of past levels of atmospheric CO<sub>2</sub>, using regression statistics. This is shown through the combining of previously published CO<sub>2</sub> records and <sup>18</sup>O/<sup>16</sup>O records. The ratio changes in response to sea ice fluctuations, thus being tied to sea level variations as well. CO<sub>2</sub> variations closely follow sea level variations and appear to be superior to the changes indicated by oxygen isotope data.

#### E-57747

Nyquist, L., Bogard, D., Takeda, H., Bansal, B., Wiesmann, H., Shih, C.Y., **Crystallization, recrystallization, and impact-metamorphic ages of eucrites Y792510 and Y791186**, *Geochimica et cosmochimica acta*, May 1997, 61(10), p.2119-2138, Refs. p.2137-2138.

Monomict eucrites Y792510 and Y791186 of pyroxene metamorphic type 6 contain areas of recrystallized mesostasis and granoblastic pyroxene. Textural comparisons suggest that the mesostasis areas in these eucrites originally resembled analogous areas in the pristine basaltic eucrite clast Y75011,84. <sup>39</sup>Ar-<sup>40</sup>Ar ages were determined for microbreccias Y791186,87 and Y792510,62 and crystalline clast Y792510,65. The <sup>147</sup>Sm-<sup>143</sup>Nd age calculated for Y792510,65 is likely to have been affected by weathering in the Antarctic. Alternatively, these Sm-Nd ages may have been affected by the event in which Ca-phosphate and augite in mesostasis were recrystallized and augite and chromite in granoblastic areas were derived from cloudy pyroxenes (late recrystallization). The subsolidus recrystallization may be a consequence of a thermal spike in the midst of an otherwise monotonically cooling environment resulting from impact cratering of the hot crust of the newly formed eucrite parent body. (Auth. mod.)

#### E-57749

Wahr, J., Han, D.Z., **Predictions of crustal deformation caused by changing polar ice on a viscoelastic Earth**, *Surveys in geophysics*, May 1997, 18(2-3), p.303-312, 17 refs.

Changes in polar ice could cause vertical crustal motion along the edge of the Greenland and antarctic ice caps. Measurements of the uplift could help constrain the changing ice volumes. The problem is complicated by the Earth's visco-elastic response to past loading, including the Late Pleistocene deglaciation. A method is described for removing these visco-elastic effects, by using simultaneous measurements of vertical motion and surface gravity. A linear combination of these two measurement types can be formed which is relatively independent of visco-elastic effects, and which can be interpreted in terms of present-day fluctuations in ice. (Auth. mod.)

#### E-57758

Hall, K., **Rock temperatures and implications for cold region weathering. I: new data from Viking Valley, Alexander Island, Antarctica**, *Permafrost and periglacial processes*, Jan.-Mar. 1997, 8(1), p.69-90, With French summary. 43 refs.

Data provided for the best part of two antarctic winters and one summer, from a variety of positions within a dry valley, show the dangers of using air temperature as a surrogate for thermal conditions either at the rock surface or at depth in the rock. Observation and non-destructive ultrasonic testing shows that water is extremely limited during the period of freeze-thaw cycles. Thus, despite the occurrence of the thermal events no damage can result from frost action. Detailed data at two minute intervals show the importance of such high resolution observations. It is not possible to discern the weathering regime, including interpreting the freeze-thaw process. Beyond anything else, this paper indicates the complexity of rock temperature regimes and suggests that it is the synergistic relationships between different weathering processes that are important. (Auth. mod.)

#### E-57762

Minor, D.R., Mukasa, S.B., **Zircon U-Pb and hornblende**



**$^{40}\text{Ar}$ - $^{39}\text{Ar}$  ages for the Dufek layered mafic intrusion, Antarctica: Implications for the age of the Ferrar large igneous province, *Geochimica et cosmochimica acta*, June 1997, 61(12), p.2497-2504, Refs. p.2503-2504.**

New high-precision zircon U-Pb ages for the Dufek intrusion establish the crystallization age for the only layered mafic intrusion known in the Ferrar igneous province, Antarctica, one of the largest igneous provinces in the world. Three concordant zircon fractions from the capping Lexington Granophyre yield an age of  $183.9 \pm 0.3$  Ma ( $2\sigma$ ), which is interpreted as the crystallization age for the Dufek intrusion. Concordant zircon fractions from a silicic dike crosscutting the upper layered gabbroic sequence yield a slightly younger crystallization age of  $182.7 \pm 0.4$  Ma ( $2\sigma$ ). For both samples, agreement within errors between the two U-Pb and  $^{207}\text{Pb}^*/^{206}\text{Pb}^*$  ages for three fractions each with a unique set of physical and chemical characteristics demonstrates that inheritance of older zircon components from the country rocks was imperceptible. It also suggests that assimilation or anatexis of the lower Paleozoic country rocks was not the dominant mechanism in the formation of the granophyre. It is inferred that the bulk of the Dufek intrusion was still fairly hot when the dated silicic dike was emplaced. (Auth. mod.)

#### E-57766

**Robert, C., Kennett, J.P., Antarctic continental weathering changes during Eocene-Oligocene cryosphere expansion: clay mineral and oxygen isotope evidence, *Geology*, July 1997, 25(7), p.587-590, 25 refs.**

The authors have analyzed clay minerals and oxygen isotopes over the Eocene-Oligocene climate transition (33.8-32.5 Ma) in Ocean Drilling Program Site 689, Maud Rise. Distinct changes in clay mineral assemblages suggest major instability in the East Antarctic climate for 0.7 m.y. during this time of general expansion of the antarctic cryosphere and cooling of the southern ocean. The clay mineral data support evidence from marine sediments suggesting that continental and marine climatic conditions during the early Oligocene were intermediate between relative Eocene warmth and intense Neogene cold. The clay mineral variations during the transition reflect major changes in continental precipitation and related continental ice accumulation. (Auth. mod.)

#### E-57777

**Hathway, B., Nonmarine sedimentation in an early Cretaceous extensional continental-margin arc, Byers Peninsula, Livingston Island, South Shetland Islands, *Journal of sedimentary research*, July 1997, 67(4), p.686-697, 49 refs.**

Upper Jurassic-Lower Cretaceous rocks of the Byers Group, exposed on Byers Peninsula, record the expansion of Gondwana-margin continental-arc facies into a marine intra-arc basin. At least 1.3 km of marine clastic rocks are overlain by about 1.4 km of Lower Cretaceous nonmarine volcanoclastic strata assigned to the Cerro Negro Formation. The base of the nonmarine succession is marked by a low-angle unconformity. Throughout the Cerro Negro Formation, thickness and facies changes provide evidence of synsedimentary displacement across a series of ENE-trending normal faults, most with downthrow to the south. In the upper part of the formation, resulting differential subsidence led to southward thickening accompanied by increased preservation of inter-eruption facies, and on a smaller scale, trapping of a fluvial channel against the footwall of a synsedimentary fault. This tectonism appears to form part of an Early Cretaceous episode of arc-perpendicular extension well documented elsewhere in the Antarctic Peninsula region. (Auth. mod.)

#### E-57781

**Zreda-Gostynska, G., Kyle, P.R., Finigan, D., Prestbo, K.M., Volcanic gas emissions from Mount Erebus and their impact on the antarctic environment, *Journal of geophysical research*, July 10, 1997, 102(B7), p.15,039-15,055, 67 refs.**

Gas emission rates from the active volcano Mount Erebus increased between 1986 and 1991:  $\text{SO}_2$  from 7.7 to 25.9 Gg/yr, HCl from 6.9 to 13.3 Gg/yr and HF from 4.0 to 6.0 Gg/yr. The emission rates of halogens from Mount Erebus are high relative to  $\text{SO}_2$  emissions and are accompanied by relatively high emissions of trace gases and aerosols. Many elements found in the Erebus plume are common impurities in antarctic

snow. Using a model which assumes a homogeneous distribution of the volcanic gas plume over Antarctica, Erebus could be a source of the impurities, by potentially contributing between 4 and 14 ng/g snow of Cl at the South Pole, and between 11 and 36 ng/g snow of Cl at Dome C. Similarly, predicted concentrations of Erebus-derived Cu, Zn, Cd, V, As, and Au in antarctic snow are close to those reported. Trace element and Pb isotope compositions of Erebus aerosols are similar to those collected in remote regions of Antarctica. The volcanic gas plume emitted from Erebus appears to make a significant contribution to the antarctic atmosphere and can be detected in the snow deposited over a wide area of the continent. (Auth. mod.)

#### E-57790

**Eugster, O., Weigel, A., Polnau, E., Ejection times of Martian meteorites, *Geochimica et cosmochimica acta*, July 1997, 61(13), p.2749-2757, 61 refs.**

Noble gas isotopic analyses were made for four meteorites whose origin is Mars: basaltic shergottites Queen Alexandra Range 94201, Zagami, the Iherzolite LEW88516, and orthopyroxenite Allan Hills 84001. The latter one was separated into orthopyroxene, chromite, and maskelynite fractions. Ejection times were calculated for all Martian meteorites using cosmic-ray exposure ages based on  $^3\text{He}$ ,  $^{21}\text{Ne}$ , and  $^{38}\text{Ar}$  concentrations and literature data on the terrestrial ages. Arguments are discussed for a scenario in which they were ejected from Mars by asteroidal or cometary impact as small meteoroids and were delivered to Earth within and up to 15 million years. Details of these arguments are provided for a range of meteoroids which eventually found their way to diverse antarctic locations at various times through the millennia, carrying unique sets of mineral and chemical combinations. (Auth. mod.)

#### E-57792

**Lipschutz, M.E., Wolf, S.F., Dodd, R.T., Meteoroid streams as sources for meteorite falls: a status report, *Planetary and space science*, May 1997, 45(5), p.517-523, 39 refs.**

Five clusters of H4-6 antarctic chondrites have been identified statistically as deriving from separate meteoroid streams. Using another criterion, the meteorites' contents of volatile trace elements determined using radiochemical neutron activation analysis, and treated by multivariate statistical analysis techniques, 3 of the 5 clusters are distinguishable from the random background of observed falls. These data indicate that distinct H chondrite sources with primary thermal histories distinguishable from those of random sources provided H4-6 chondrites that fell in May, 1855-1895, and in Sep.-Oct, 1812-1992. Thus, both in the short-term, and the long-term (>50 kyr) as evidenced by antarctic H4-6 chondrites, time-dependent variations occur in the Earth's sampling of common meteorites. The source-variations indicated by the data apparently reflect the existence of meteoroid streams which complete the hierarchy of comet streams, asteroid streams and fireball streams of asteroidal origin established by others. (Auth.)

#### E-57793

**Lodolo, E., Late Miocene plate boundary reorganization along the westernmost Pacific-Antarctica ridge, *Tectonophysics*, June 30, 1997, 270(4), p.295-305, 36 refs.**

Magnetic and bathymetric measurements carried out in the Pacific Ocean south of  $60^\circ\text{S}$ , add new information on the structural fabric and tectonic development of the westernmost portion of the Pacific-Antarctic plate boundary. The plate boundary includes in its northern part a series of short spreading centers offset by NNW-SSE-trending fracture zones. Towards the south, it becomes structurally more complicated and appears to be formed by extension along an ancient strike-slip lineation, as a consequence of a change in the Pacific-Antarctic relative motions that resulted in a geometric readjustment of the plate boundary. The identification of marine magnetic lineations crossing this portion of the boundary testifies that this readjustment is relatively recent; the newly created crust is not older than Late Miocene and is presently surrounded by oceanic regions where the magnetic anomalies range from 19 to 24 (ca. 41-53 Ma) northeastward, and from 7 to 9 (ca. 24.5-28 Ma) southwestward. This segment of the plate boundary formed along an older fracture zone that was pulled apart by the new plate motions, and the segmented ridge-transform system then evolved. (Auth.)



**E-57798**

Beyer, L., Knicker, H., Blume, H.P., Bölter, M., Schneider, D., **Soil organic matter of spodic horizons in soils of coastal continental Antarctica and Germany, U.S. Army Cold Regions Research and Engineering Laboratory. Special report**, Apr. 1997, SR 97-10, International Symposium on Physics, Chemistry, and Ecology of Seasonally Frozen Soils, Fairbanks, AK, June 10-12, 1997. Proceedings. Edited by I.K. Iskandar, et al, p.443-448, 33 refs.

The soil organic matter (SOM) of relic ornithogenic soils in coastal continental Antarctica, which showed morphological features like a Podzol, was compared to spodic horizons in Germany. The authors' goal was to unravel the little knowledge of organic matter of ornithogenic soils by means of wet-chemistry and nuclear magnetic resonance spectroscopy (NMR). In contrast to the German soils the SOM of the antarctic soils was characterized by a high percentage of amino derivatives from proteins, polysaccharides, urates and chitin, resulting in a mean C-to-N ratio of 10. The high content of carboxyl carbon units probably derived from amino and other organic acids. The pattern of the  $^{15}\text{N}$ -NMR spectra of the penguin guano suggested the presence of uric acid. Concerning the podzolization process the data suggested the migration of organic acids, not-humified carbohydrates and N-containing moieties, from the topsoil into the spodic horizons of the ornithogenic soils. In the SOM of Podzols formed under temperate climate conditions N-compounds, and non-humified carbohydrates were of minor importance within the SOM translocation processes. (Auth.)

**E-57799**

Beyer, L., Blume, H.P., Sorge, C., Schulten, H.R., Erlenkeuser, H., **Humus composition and transformation in a pergelic terric cryohemist of coastal continental Antarctica, U.S. Army Cold Regions Research and Engineering Laboratory. Special report**, Apr. 1997, SR 97-10, International Symposium on Physics, Chemistry, and Ecology of Seasonally Frozen Soils, Fairbanks, AK, June 10-12, 1997. Proceedings. Edited by I.K. Iskandar, et al, p.459-464, 29 refs.

Organic matter of an antarctic peat soil was studied with special emphasis on soil formation processes. An integrated approach, including wet-chemical analyses, cross-polarization magic angle spinning carbon-13 nuclear magnetic resonance spectroscopy (CP/MAS  $^{13}\text{C}$ -NMR), and pyrolysis-field ionization mass spectrometry (Py-FIMS), was applied to characterize the soil organic matter (SOM) composition at different depths. Dead moss was the fresh organic matter. Aliphatic-C units dominate in the SOM. Alkyl compounds consist of lipids, fatty acids and sterols. The aromatic structures identified by CP/MAS  $^{13}\text{C}$ -NMR and by Py-FIMS demonstrate that lignin input is not necessary for the formation of aromatic humic structures. Within the humification process, carbohydrates are less mineralized in Antarctica than under temperate climate conditions and these moieties also dominate in the SOM of deeper horizons. The extremely cold climate conditions of Antarctica retard the transformation of fresh organic residues. Nevertheless, alkyl carbon units are incorporated into the complex humic matter and enriched due to a selective preservation. (Auth.)

**E-57813**

Beyer, L., Knicker, H., Blume, H.P., Bölter, M., Vogt, B., Schneider, D., **Soil organic matter of suggested spodic horizons in relic ornithogenic soils of coastal continental Antarctica (Casey Station, Wilkes Land) in comparison with that of spodic soil horizons in Germany, Soil science**, July 1997, 162(7), p.518-527, 51 refs.

Soil organic matter (SOM) investigations were carried out by means of wet chemical SOM analyses and carbon-13 and nitrogen-15 nuclear magnetic resonance (NMR) spectroscopy. The purpose is to compare these data with those obtained from spodic horizons formed under temperate climate conditions. This comparison should provide the first information concerning the possibility of podzolization in Antarctica. In contrast to the spodic horizons in Germany, the SOM of the antarctic soils is characterized by a high percentage of amino derivatives from proteins, polysaccharides, urates, and chitin, resulting in a mean C-to-N ratio of 10 and a high content of carboxyl carbon units, which probably derived from amino and other organic acids. The  $^{15}\text{N}$ -NMR spectrum of

penguin guano suggests the presence of uric acid (2,6,8-trioxypurine). The data suggest that migration of organic acids, not-humified carbohydrates, and N-containing moieties from the topsoil moving into the spodic horizons of the ornithogenic soils affect the podzolization process. In the SOM of the German Podzols, N-compounds and not-humified carbohydrates were of minor importance within the SOM translocation processes. (Auth. mod.)

**E-57816**

Taylor, S., Lever, J.H., Harvey, R.P., Govoni, J., **Collecting micrometeorites from the South Pole Water Well, U.S. Army Cold Regions Research and Engineering Laboratory. Report**, May 1997, 37p., ADA-327 829, 36 refs.

A collector was designed and built to retrieve micrometeorites from the floor of the South Pole Water Well. The large volume of firn and ice being melted for the well and the low component of terrestrial material in antarctic ice make the South Pole Water Well an ideal place to collect micrometeorites. Because the age of the ice being melted is known, yearly or periodic collections provide large numbers of micrometeorites of known terrestrial age. The collector was designed to pose no threat to the well's water quality, to be reliable and easy to operate, and to collect particles larger than 50  $\mu\text{m}$ . This report details how this collector was built and tested and documents the rationale behind some of the design choices. It also includes preliminary findings from the first deployment. (Auth.)

**E-57833**

Sàbat, F., Zheng, X.S., Casas, J.M., Pallàs, R., **Stratigraphy of volcanic material at Hannah Point [Estratigrafía de los materiales volcánicos de Punta Hannah (Isla Livingston, Shetland del Sur)]**, Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.161-170, In Spanish with English summary. Refs. p.169-170.

The Hannah Point's cross section consists of volcanic and volcanoclastic rocks belonging to the Antarctic Peninsula Volcanic Group. Three cycles corresponding to different volcanic events can be distinguished in the volcanic sequence. The lower cycle consists of dacitic lavas and volcanoclastic breccias. An unconformity marks the boundary between the lower and middle cycles. The middle cycle records a whole volcanic event; it starts with andesitic pyroclastic rocks, followed by andesitic-basaltic lavas and ending with rhyolitic volcanoclastic breccias. The upper cycle consists mainly of fresh basaltic lavas. Around the above mentioned unconformity there is a weak zone where strong zeolite alteration and dykes are present. Bedding attitude is regular and slightly dipping to NNW suggesting that this area has been stable after the volcanic events. Hannah Point area is a good example of the Cretaceous volcanic activity that formed the South Shetland Is. (Auth.)

**E-57834**

Arche, A., Martínez de Pisón, E., Serrano, E., **Subaqueous sliding on Byers Peninsula [Deslizamientos subacuáticos en la Formación Byers (Berriasiense-Valaginesiense, Cretácico Inferior), Península Byers, Isla Livingston, Shetland del Sur]**, Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.171-170, In Spanish with English summary. 18 refs.

Internal deformation processes affect some levels of the Mixed marine member, the Byers Formation on Byers Peninsula. Its episodic character, the vertical boundaries of the deformed levels, and the vertical internal organization point out to a submarine slide origin, perhaps related to earthquakes. (Auth.)

**E-57835**

Pallàs, R., Vilaplana, J.M., Sàbat, F., **Neotectonics of the Hurd Peninsula [Análisis neotectónico de la Península Hurd, Isla Livingston]**, Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings).



Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.181-194, In Spanish with English summary. 17 refs.

The Hurd Peninsula presents neotectonic features, such as faults, affecting the landforms and a set of marine emerged levels. A detailed local study of these features provides information on the recent structural and geomorphologic evolution of the area. It is suggested that Hurd Peninsula is divided into several tectonic blocks separated by faults. Movement of the faults determines the relative altitude of these blocks and, consequently, their susceptibility to glacial, periglacial or marine processes. Although part of the tectonic movements reflected in the landforms may have been inherited from former phases of deformation, neotectonic faulting seems to have been active since either oligocene or, more likely, neogene times. Correlation of the emerged beaches of different localities suggest that neither major nor fast movements of tectonic blocks have taken place at Hurd Peninsula during the Late Holocene. (Auth.)

#### E-57836

Calvet, J., Pallàs, R., Sàbat, F., Vilaplana, J.M., **Dating ash-layers in glaciers of Livingston I.** [Los niveles de cenizas de los glaciares de Livingston. Criterio para su datación], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.195-208, In Spanish with English summary. Refs. p.207-208.

Glaciers along the coast of Livingston I. end in ice-cliffs several tens of meters high which show many layers of volcanic ash. According to a similar pattern at the sites studied, these ash-layers seem to have a homogeneous distribution all around the island. Assuming that the ash is of volcanic origin, the literature covering volcanic eruptions on Deception I. is reviewed, as are the studies of lacustrine sediments of Byers Peninsula, to estimate the age of the ash-layers on Livingston I. It is concluded that the lowest layers may correspond to eruptions which occurred at the beginning of the 19th century.

#### E-57837

Rey, J., Somoza, L., Martínez-Frías, J., **Geology of Deception I. in the geodynamic framework of the Bransfield Rift** [Evidencias tectónicas, volcánicas e hidrotermales en Isla Decepción, relacionadas con el marco geodinámico de la cuenca de Bransfield (Antártida)], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.209-221, In Spanish with English summary. Refs. p.220-221.

Based on high-resolution seismic reflection profiles and submarine sediment sampling carried out on Deception I., the relationships were established of active fumaroles and mineralizing hydrothermal episodes with normal faulting and present volcanism in the confluence between Livingston Fault Zone and the Bransfield Rift. A regional tectonic extension model is suggested to explain the sequence of volcanic and hydrothermal events. The tectono-stratigraphic units show a sequence of Quaternary volcanic cones which display high contents of Fe, Mn and Zn. (Auth. mod.)

#### E-57838

López, J., Ramos, M., Criado, C., Serrano, E., Nicolás, P., **Geothermal anomalies and permafrost on Deception I.** [Anomalías geotérmicas y permafrost en la Isla Decepción, Antártida], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.223-234, In Spanish with English summary. 17 refs.

Temperature distribution in the main area of geothermal anomalies on Deception I., and permafrost development and depth, are discussed. Data show that temperatures decrease with increasing distance from the heat centers, and that most of the anomalies are located in the inner part of the caldera ring. However, vapor emissions at temperatures over 40°C

were noted outside of the Stonethrow Ridge. The permafrost is widely distributed on the island, with depths between 60 and 96 cm at relatively low altitudes. It is found that the geothermal flux on the island has no significant effect on glaciers' melt.

#### E-57839

Villegas, M.T., Caselli, A.T., **Fumaroles of Deception I. during the austral summer** [Fumarolas de Decepción: evolución a lo largo del verano austral], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.235-242, In Spanish with English summary. 10 refs.

Chemical analyses of numerous gas samples from Fumarole Bay on Deception I. show an increase of H<sub>2</sub>S versus CO<sub>2</sub> and, therefore, an increase in H<sub>2</sub>S/CO<sub>2</sub> ratio. This is found to be justified by 2 well differentiated effects: one, by an endogeneous contribution of basically magmatic nature, indicating the opening of new fractures in the conduit, and the other by superficial characteristics, producing a seasonal change in the physicochemical conditions of the aquifer. It is concluded that the correlation between the S/C ratio and the H<sub>2</sub>O percentage seems to indicate that the water in the fumarolic gases comes, mainly, from a deep aquifer. (Auth. mod.)

#### E-57878

Papadakis, I., Taylor, P.D.P., De Bièvre, P., **SI-traceable values for cadmium and lead concentration in the candidate reference material, MURST-ISS A1 Antarctic sediment, by combination of ICP-MS with isotope dilution**, *Analytica chimica acta*, June 30, 1997, 346(1), p.17-22, 17 refs.

The meaning of traceability to SI and how this can be achieved by using primary methods is demonstrated in this paper, using the example of the certification for Cd and Pb concentration in the candidate reference material, MURST ISS A1 antarctic sediment. The analytical method used was inductively coupled plasma mass spectrometry (ICP-MS) in combination with isotope dilution (ID). ID is recently recognized as a primary method, and its advantages are presented. Microwave pressure digestion and separation (anion exchange) were applied. The uncertainty budget calculation is performed according to the EURACHEM and ISO guidelines, and some useful considerations about other approaches are given. (Auth.)

#### E-57879

Mahood, A.D., Barron, J.A., **Comparative ultrastructure of two closely related *Thalassiosira* species: *Thalassiosira vulnifica* (Gombos) Fenner and *T. fasciculata* Harwood et Maruyama**, *Diatom research*, 1996, 11(2), p.283-295, Refs. p.294-295.

The distinctive morphology and relatively short geological range (3.25 to 2.5 Ma) of *Thalassiosira vulnifica* (Gombos) Fenner make it especially useful for Pliocene biostratigraphic studies in the antarctic region. *T. fasciculata* Harwood et Maruyama has a geological range (4.5 to 0.75 Ma) that overlaps that of *T. vulnifica* and it resembles this taxon in possessing prominent fulcra on the valve face, strongly fasciculated aerolae, and distinctive marginal fulcra. However, the greater spacing between rows of aerolae and the larger distinctive fulcra present in *T. vulnifica* clearly separate it from *T. fasciculata*. The importance of accurate identification is discussed as it relates to ongoing antarctic glacial sediment studies. (Auth.)

#### E-57880

Sims, P.A., Hendey, N.I., ***Fontigonium*, a new genus of biddulphioid diatoms**, *Diatom research*, 1996, 11(2), p.373-378, 9 refs.

Intact valves of a species originally described as *Triceratium rectangulare* Grove & Sturt have been found in VEMA core material from the Falklands Plateau. Characters additional to those described by Grove & Sturt separate this taxon at generic level from all other known diatoms and a new genus, *Fontigonium*, is established for it. The genus appears to be restricted to the middle to upper Eocene of the South Pacific and



South Atlantic Oceans. Relationships with *Trinacria* Heiberg and *Solium* Heiberg are discussed and *Fontigonium* is placed in the family Hemiaulaceae Heiberg. (Auth.)

#### E-57889

Feldmann, R.M., Gaździcki, A., **New species of *Glyphea* (Decapoda: Palinura) from the La Meseta Formation (Eocene) of Seymour Island, Antarctica, *Acta palaeontologica polonica*, 1997, 42(3), p.437-445, With Polish summary. Refs. p.443-445.**

A new species of palinuran lobster, *Glyphea reticulata*, from the lowermost part of the Eocene La Meseta Formation on Seymour I., represents one of the stratigraphically youngest species of *Glyphea*. The occurrence of the last vestiges of what was previously a cosmopolitan genus in a region dominated by Pacific Ocean faunal influences is significant because the sole extant species of the Glypheidae, *Neoglyphea inopinata* Forest & Saint Laurent, 1975, is known only from the west Pacific. (Auth.)

#### E-57895

Prieto, M.J., Canals, M., Ercilla, G., De Batist, M., **Seismic stratigraphy of the margins of the Bransfield Basin, the Antarctic Peninsula and the Ross Sea [Estratigrafía sísmica comparada de los márgenes de la Cuenca Central de Bransfield, la Península Antártica y el Mar de Ross (Antártida Occidental)], *Geogaceta*, July 1996, 20(1), p.146-149, In Spanish with English summary. 16 refs.**

The glacial periods are recorded in the sedimentary cover of three margins of West Antarctica as prograding units and erosive surfaces. A comparison of the margins reveals the regional significance of the ice cap growth; the interaction between climate and lithospheric movements is found to be responsible for the number of sedimentary units and the growing processes. An extensive erosive surface, dated at approximately 6 Ma. and overlaid by a large prograded sedimentary unit, is attributed to increased frequency of sea level changes in Upper Pliocene. (Auth. mod.)

#### E-57896

Cantrill, D.J., **Hepatophytes from the Early Cretaceous of Alexander Island, Antarctica: systematics and paleoecology, *International journal of plant sciences*, July 1997, 158(4), p.476-488, Refs. p.487-488.**

Hepatophytes form an important component of the Lower Cretaceous (late Albian) flora of Alexander I. The liverworts *Marchantites rosulatus* n.sp., *Thallites bicostatus* n.sp., and *Thallites* sp. colonized freshly deposited river sands and muds, forming distinct carpets. Within established plant communities, *M. pinnatus* n.sp. and *M. taenioides* n.sp. formed a ground layer beneath an overstory of the ferns *Alamatus bifarius* and *Aculea acicularis*. Swampy communities with an overstory of the conifers *Podozamites* and *Elatocladus* contained a variety of thalloid and leafy liverworts (*Hepaticites* spp.). The distribution of *in situ* liverworts, and a clear association of taxa with a variety of foliage types, indicated that the hepatophytes occupied a wide range of ecological niches during the Cretaceous. The high within-flora diversity and relative abundance of individual hepatics appeared to be a special feature of high-latitude vegetation during the Cretaceous. (Auth. mod.)

#### E-57897

Del Río, C.J., **Cenozoic biogeographic history of the eurythermal genus *Retrotapes*, new genus (Subfamily Tapetinae) from southern South America and Antarctica, *Nautilus*, July 18, 1997, 110(3), p.77-93, Refs. p.91-93.**

*Retrotapes*, n.gen., comprises a group of Neoaustral bivalves that appeared in the southern circumpolar regions by the Eocene and have since been confined to the high latitudes of the Southern Hemisphere. Its presence in the Tertiary strata of Antarctica and southern South America reflects an active faunal interchange between both regions during the Eocene. *Retrotapes* is here proposed to include to those Recent and Tertiary representatives of the Subfamily Tapetinae (Family Veneridae) from southern South America and Antarctica that had been previously

placed in *Venus* Linné, 1758, *Marcia* H. and A. Adams, 1857, *Eurhoma-lea* Cossmann, 1920, *Samarangia* Dall, 1902, and *Kalelysia* Römer, 1857. (Auth. mod.)

#### E-57919

Grad, M., Shiobara, H., Janik, T., Guterch, A., Shimamura, H., **Crustal model of the Bransfield Rift, West Antarctica, from detailed OBS refraction experiments, *Geophysical journal international*, Aug. 1997, 130(2), p.506-518, 42 refs.**

The first detailed deep seismic refraction study in the Bransfield Strait using sensitive OBSs (ocean bottom seismographs) was carried out successfully during the antarctic summer of 1990-91. The experiment focused on the deep crustal structure beneath the axis of the Bransfield Rift. This paper gives the first presentation of the results. A detailed model of the crustal structure was obtained by modelling the observed traveltimes and amplitudes using a 2-D ray-tracing technique. (Auth. mod.)

#### E-57925

McCarron, J.J., Millar, I.L., **Age and stratigraphy of fore-arc magmatism on Alexander Island, Antarctica, *Geological magazine*, July 1997, 134(4), p.507-522, 45 refs.**

High-resolution  $^{40}\text{Ar}/^{39}\text{Ar}$ , U-Pb zircon, fission track and K-Ar ages demonstrate that subduction-related fore-arc magmatism migrated northwards along the length of Alexander I. between ca. 80 Ma and ca. 46 Ma. The magmatic rocks represent a third of the western margin of the Antarctic Peninsula magmatic arc and are critical to the understanding of the final phase of subduction along the southern Antarctic Peninsula margin. The onset of late Cretaceous magmatism is recorded by poorly exposed volcanic rocks on Monte Verdi Peninsula. The volcanic rocks of Finlandia Foothills probably represent the youngest calc-alkaline units on Alexander I. The sequence is lithologically similar to the Elgar Uplands and also contains high Mg number andesite lavas, but it is dominated by polymict conglomerates, with minor lavas, which were deposited in a graben associated with regional extension. Plutonic rocks exposed in the Rouen Mountains, adjacent to the Elgar Uplands, yielded a U-Pb age of  $56 \pm 3$  Ma. (Auth. mod.)

#### E-57969

Duphorn, K., Schmidt-Thomé, M., **Basement, glacial and coastal geology around Gondwana Station, Antarctica, *Geologisches Jahrbuch. Reihe B*, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.13-39, With German and Russian summaries. 56 refs.**

Because the recent lateral moraine of Campbell Glacier at Gerlache Inlet is not visible on aerial photographs taken on Dec. 10, 1957, the authors suggest that this lateral moraine started to thaw during the last three decades. The highest Holocene coastline of the Ross Sea is at an elevation of 30 m, as a result of isostatic uplift after the melting of the ice of the ice shelf carrying the Young Drift. Raised beach ridges can be distinguished from till strips and lateral moraines on the basis of fabric and grain-size analysis, but also by petrographic and morphometric analysis of the pebbles and boulders. The most intensive antarctic tafoni weathering occurs along the coastal zone reached by sea spray and on top of Mt. Abbott (1022 m above m.s.l.). Other reports on pre-Quaternary fossil reddish soils on Mt. Browning cannot be confirmed. (Auth. mod.)

#### E-57970

Duphorn, K., Van der Wateren, F.M., Höfle, H.C., **Late Quaternary geology of the area north of Reeves Glacier, Antarctica, *Geologisches Jahrbuch. Reihe B*, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.41-56, With German and Russian summaries. 19 refs.**

On the basis of mapping the glacial geology and distribution patterns of the erratics, it is demonstrated that during the last Ice Age the lower part of Reeves Glacier, a large outlet glacier in Victoria Land, was approximately 550 m thicker than today as a result of ice sheet grounding in the Ross Sea. This also led to thickening of the alpine tributary glaciers which join Reeves Glacier from the adjacent part of the Transant-



arctic Mountains north of it. These alpine tributary glaciers were diverted eastward into a drainage network (550 m higher than today) branching around isolated nunataks, following valleys along Andersson Ridge that are ice-free at present. Reconstruction of this old drainage network also helped to find hitherto unknown outcrops of early Palaeozoic rhyolites. (Auth.)

#### E-57971

Höfle, H.C., Henningsen, D., Vetter, U., **Erratics in the Outback Nunataks of northern Victoria Land and their provenance**, *Geologisches Jahrbuch. Reihe B*, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.57-71, With German and Russian summaries. 7 refs. It is noted that the first author of this paper died before it was finished. Henningsen and Vetter completed the project on the basis of field work and a draft manuscript by Höfle.

Numerous erratics deposited by former ice sheets during glacial maxima were found on the Outback Nunataks in northwestern Victoria Land. Mapping of the small-scale erosional forms on glaciated bedrock surfaces at the sites where the erratics were found shows that the flow directions of the former ice sheet correspond approximately to those of present-day glaciers. The largest number of erratics in the best state of preservation occurs in the immediate vicinity of the present-day margin of the ice sheet on the lowest part of the Outback Nunataks. The number of erratics decreases markedly with increasing elevation; thus at the upper limit of their distribution only the most resistant rocks are found and these are relatively rare. The upper limit is 50-250 m above the present-day surface of the ice sheet. On the basis of detailed thin section study, the local erratics were distinguished from those transported from further away and, using the flow directions of the ice sheet, information was deduced about the origin of the erratics. (Auth.)

#### E-57972

Molzahn, M., Wilhelm, S., Wörner, G., **Evidence for arc-related magmatism associated with the Ross orogeny at the Walker Rock Nunataks, northern Victoria Land, Antarctica**, *Geologisches Jahrbuch. Reihe B*, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.73-96, With German and Russian summaries. 29 refs.

Metamorphic Wilson Terrane basement is unconformably overlain by a sequence of volcanic and subvolcanic rocks. Younger intrusive rocks of the Granite Harbor suite intrude both the basement and the volcanic pile. The rocks of the volcanic to subvolcanic Johnnie Walker Formation range from intermediate to acidic, whereas Granite Harbor Intrusives and associated inclusions show basic to acidic compositions. A three-point whole-rock and mineral isochron for undeformed Irizar Granite gives an age of 525 Ma and an initial Sr isotope ratio of 0.705873. Zones with abundant xenoliths occur within the granitoids. Many of these xenoliths show evidence for complex mixing with the host granite. Magma mingling and various types of hybrid rocks have been observed. The intrusive rocks and Johnnie Walker volcanics form continuous geochemical trends and may be genetically related to each other. Volcanics of the Johnnie Walker Formation are therefore interpreted as being related to a subduction zone that was active during convergence of the Bowers Terrane with the Wilson Terrane. (Auth. mod.)

#### E-57973

Roland, N.W., Wörner, G., **Kirkpatrick flows and associated pyroclastics: new occurrences, definition, and aspects of a Jurassic transantarctic rift**, *Geologisches Jahrbuch. Reihe B*, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.97-121, With German and Russian summaries. 58 refs.

This study describes an area of Kirkpatrick pyroclastic lavas and flow patterns in northern and central Victoria Land. New geographic features in the region are named, and new names are proposed for some of the established features based on structures and geologic periods.

#### E-57974

Van der Wateren, F.M., et al, **Glaciation and deglaciation of the uplifted margins of the Cenozoic West Antarctic Rift System, Ross Sea, Antarctica**, *Geologisches Jahrbuch. Reihe B*, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.123-155, With German and Russian summaries. 43 refs.

The West Antarctic rift system started to become active during the early to mid-Cenozoic, roughly at the same time that the East Antarctic ice sheet developed. Geological and geophysical investigations in the Transantarctic Mountains and western Marie Byrd Land link the glacial histories and tectonic/volcanic evolution of the two rift margins. The parallel evolutions of the East and West Antarctic ice sheets and the rift system have produced landscapes of a markedly uniform topography, despite differences in bedrock geology. In regions of low to moderate tectonic uplift the landscapes comprise summit plateaus up to 800 m above the present ice surface, erosion terraces several hundred meters below these, and cirques and ice-cored moraines. Regions of very rapid uplift have an alpine topography of very high relief, lacking plateaus and terraces. (Auth. mod.)

#### E-57975

Wörner, G., Zipfel, J., **Mantle P-T path for the Ross Sea rift margin, Antarctica, derived from mineral zoning in peridotite xenoliths**, *Geologisches Jahrbuch. Reihe B*, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.157-167, With German and Russian summaries. 18 refs.

Plagioclase-spinel peridotite and spinel peridotite xenoliths occur in basanite lavas of the Mt. Melbourne Volcanic Field at the margin of the Ross Sea Rift. Distinct calcium distribution patterns in their olivines correlate with three different types of texture: ELZ types have equigranular textures, low calcium concentrations (60 ppm) in olivine cores and show strong zoning to 200 ppm at the rims. PLH types are protogranular to porphyroclastic and have low, homogeneous calcium contents (120-200 ppm). EHH types are equigranular and their olivines have a high homogeneous calcium content (470-490 ppm). Temperature and pressure estimates using the trace contents of Ca in olivine together with the two-pyroxene thermometer allow one to reconstruct the evolution of the upper mantle beneath the Ross Sea Rift margin. (Auth. mod.)

#### E-57976

Smith, C.H., **Migmatites of the Alexandra Mountains, West Antarctica: pressure-temperature conditions of formation and regional context**, *Geologisches Jahrbuch. Reihe B*, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.169-178, With German and Russian summaries. 13 refs.

Gneisses of Scott Nunataks can be characterized as having a single, shallowly to moderately dipping stromatic foliation, indicative of a single-stage metamorphic evolution. In this way, the paragneisses differ from those of the Fosdick Mountains, an areally extensive migmatite complex 200 km to the NNW in the northern Ford Ranges of Marie Byrd Land. Other differences are that Scott Nunataks lack a stable aluminosilicate phase and have overall higher calculated pressures of peak metamorphism than the Fosdick Complex. On the basis of metamorphic textures, mineral assemblages, and thermobarometry, the gneisses of Scott Nunataks are interpreted to have developed through contact metamorphism adjacent to Cretaceous Byrd Coast Granite plutons. (Auth.)

#### E-57977

Adams, C.J., **Geochronological evolution of the eastern margin of northern Victoria Land: Rb-Sr and K-Ar dating of the Berg Group and Berg/Archangel granites**, *Geologisches Jahrbuch. Reihe B*, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.179-194, With German and Russian summaries. 19 refs.



K-Ar total-rock mineral and Rb-Sr whole-rock isochron ages are reported for Berg Group metasediments and Berg/Arkhangel'skiy granites in the Berg Mountains and Arkhangel'skiy Nunataks. For the Berg Group, K-Ar total-rock ages of slates, 478-492 Ma, reflect rapid regional cooling after local emplacement of younger granite, which yields a Rb-Sr whole-rock isochron age of 439 Ma. The Arkhangel'skiy granite yields an older Rb-Sr whole-rock isochron age, 573 Ma, which pre-dates the main structural event seen in Berg Group metasediments. Initial strontium isotopic compositions of Berg Group at the time of metamorphism, 0.715-0.717, are broadly similar to those of Robertson Bay Group and other Gondwana pacific margin metasedimentary units of northern Victoria Land and New Zealand, but contrast with more radiogenic metasediment units in the central part of the Wilson Terrane of northern Victoria Land. A mature granitoid provenance for the Berg Group, probably of mid to late Proterozoic age, is suggested. (Auth. mod.)

#### E-57978

Olesch, M., Roland, N.W., Fenn, G., Krauss, U., **Petrogenesis of granitoid rocks of Oates Land, Antarctica**, *Geologisches Jahrbuch. Reihe B*, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.195-245, With German and Russian summaries. 43 refs.

The intrusives of Oates Coast comprise gabbroid and granitoid units that formerly were labelled as Granite Harbour Intrusives. However, petrological and geochemical analyses show that the granitoids differ in composition, as well as in their mode of generation and emplacement, and thus probably in their plate-tectonic setting. Initial qualitative and quantitative petrographical studies of the granitoids reveal four main units: normal granites (rock-forming minerals are quartz, plagioclase, K-feldspar, and biotite); muscovite-bearing granitoids, with additional primary muscovite; hornblende-bearing granitoids, with additional hornblende; and garnet-bearing granitoids, with additional garnet. The garnet-bearing granitoids can be subdivided into further subunits with additional muscovite or hornblende. The granitoids show a distinct regional distribution. (Auth. mod.)

#### E-57979

Schüssler, U., **Metamorphic rocks in the northern Wilson Terrane, Oates Coast, Antarctica**, *Geologisches Jahrbuch. Reihe B*, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.247-269, With German and Russian summaries. 35 refs.

The high-grade complex is dominated by metaclastites that are typically more or less intensively migmatized. The complex can be subdivided into an eastern zone west of the Wilson Thrust; a central zone just east of Matusевич Glacier; and a western zone formed by the Lazarev Mountains west of Matusевич Glacier. Orthopyroxene-bearing rocks have been found at 5 localities in the central zone, indicating granulite-facies conditions. It is suggested that the Orthopyroxene-bearing rocks in the central zone of the Oates Coast metamorphic complex are not relics of the old cratonic basement, but crystallized together with very high-grade migmatites of the central zone during Ross metamorphism. The central zone was thrust onto the western zone along the Eastern Exiles Thrust by compressive movements during the Ross Orogeny, and thus represents a deeper level of the metamorphic complex than the eastern and the western zones. (Auth. mod.)

#### E-57980

Skinner, D.N.B., Jordan, H., Schmidt-Thomé, M., **Berg Group of Oates Land, East Antarctica**, *Geologisches Jahrbuch. Reihe B*, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.271-293, With German and Russian summaries. 18 refs.

Berg Group consists of a thermally and regionally metamorphosed, tightly folded turbidite unit of quartzofeldspathic greywackes with pelitic interbeds, trending to feldspathic quartz wacke in the east and, with coarsening grain size, to arkosic arenites, particularly in the west. A calcareous component ranges from nodular concretions, lenses and discrete

layers, to a 50-m thick carbonate member comprised of calcarenite to calcilutite with silt wacke interbeds. Sedimentation was derived from a granite and high-grade metamorphic terrain. An earlier regional thermal metamorphism preceded the deformation climax and produced low-grade facies biotite-sericite-quartz-albite assemblage in the wackes and green amphibole-quartz-calcite-albite in the calcareous rocks. A later post-deformation thermal metamorphism produced biotite and actinolite/hornblende-grade albite-epidote hornfels. The source of the later thermal event is most probably the granite on the western ridge of the Berg Mountains and at Outrider Nunatak. K-Ar and Rb-Sr dates for the metasediments and granites reflect two thermal metamorphic events associated with the emplacement of granitic intrusions. (Auth. mod.)

#### E-57985

Kinny, P.D., Black, L.P., Sheraton, J.W., **Zircon U-Pb ages and geochemistry of igneous and metamorphic rocks in the northern Prince Charles Mountains, Antarctica**, *AGSO Journal of Australian geology and geophysics*, 1997, 16(5), p.637-654, Analytical geochemical notes are contained in an appendix following the references list. 44 refs.

High-grade metamorphic and felsic igneous rocks from the northern Prince Charles Mountains have been characterized geochemically and dated from SHRIMP zircon geochronological data. Around 980 Ma ago, voluminous magmas representing a combination of mantle-derived and intracrustal melts, including orthopyroxene quartz monzonite on Loewe Massif and granitic and syenitic intrusions on Mount Collins, were emplaced during a regional high-grade tectonothermal event. Garnet leucogenesis sheets on Mount McCarthy, the products of local partial melting, were also emplaced at about this time. The geology of Fisher Massif is exceptional in that a ca. 1280 Ma metavolcanic sequence and coeval granodiorite have been metamorphosed only up to the lower amphibolite facies, and intruded by a ca. 1020 Ma biotite granite. None of the analyzed samples shows in its isotopic systematics the effects of 500 Ma events, prominent elsewhere in East Antarctica. Rare inherited components 1850-1900 Ma were found in some samples. A paragenesis on Mount Meredith yielded 2500-2800 Ma and 1800-2100 Ma detrital zircon populations. (Auth.)

#### E-57987

Shimoyama, A., **Complex organics in meteorites**, *Advances in space research*, 1997, 19(7), Life sciences: complex organics in space. Proceedings of the F3.2 Symposium of COSPAR Scientific Commission F which was held during the Thirty-first COSPAR Scientific Assembly, Birmingham, U.K., 14-21 July 1996. Edited by F. Raulin and J.M. Greenberg, p.1045-1052, 29 refs.

Complex macromolecular organic matter is present in carbonaceous chondrites as the most abundant organic matter and may be present in interstellar dusts and comets. Studies of the complex organic matter isolated from 6 CM2 chondrites, Yamato-74662, Yamato-791198, Yamato-793321, Yamato-86720, Belgica-7904, and Murchison are introduced and discussed. The complex organic matter was examined by heating experiments to obtain information on its chemical constituents and characteristics. Three chondrites, Yamato-74662, Yamato-791198, and Murchison which have solvent-extractable organic compounds possess thermally labile organic fraction in the complex organic matter. Organic compounds detected in the pyrolyzate of the complex organic matter number over 130, of which aromatic hydrocarbons are dominant. They appeared around 300°C, and disappeared at about 600°C with a maximum at 400-500°C during the heating. The other 3 chondrites do not have the extractable organic compounds nor a thermally labile organic fraction. (Auth. mod.)

#### E-57990

Beyer, L., Blume, H.P., Sorge, C., Schulten, H.R., Erlenkeuser, H., Schneider, D., **Humus composition and transformations in a Pergelic Cryohemist of coastal Antarctica**, *Arctic and alpine research*, Aug. 1997, 29(3), p.358-365, 41 refs.

Soil organic matter (SOM) of an antarctic Pergelic Cryohemist was studied with special emphasis on soil formation processes under extreme climate conditions. An integrated approach using wet-chemical analyses, carbon-13 nuclear magnetic resonance spectroscopy and pyrolysis-



field ionization mass spectrometry was applied to characterize the SOM composition at different depths. Dead mosses material are the source of fresh organic matter for soil formation in the Pergelic Cryohemist. The chemical degradation of the organic matter is not as intensive as in soils of temperate climate regimes. The extremely cold climate conditions retard the transformation of fresh organic residues. Therefore in this antarctic peaty soil, carbohydrates dominate in the composition of the SOM also in the deeper horizons. (Auth. mod.)

#### E-57996

Priscu, J.C., **Biogeochemistry of nitrous oxide in permanently ice-covered lakes of the McMurdo Dry Valleys, Antarctica**, *Global change biology*, Aug. 1997, 3(4), p.301-315, Refs. p.313-315.

This manuscript presents an overview of published work on nitrous oxide in the permanently ice-covered lakes of the McMurdo Dry Valleys. Recent data on nitrous oxide from the major lakes in this region of Antarctica are used to draw general conclusions regarding sources and sinks for this gas within the liquid water column, and to estimate exchanges with the atmosphere. Areal flux from the lakes to the atmosphere is several hundred times greater than areal fluxes reported for oceanic systems. Owing to the relatively small combined surface area of these lakes, absolute atmospheric transfer is only a small fraction of annual global emission. (Auth. mod.)

#### E-57997

Hart, S.R., Blusztajn, J., LeMasurier, W.E., Rex, D.C., **Hobbs Coast Cenozoic volcanism: implications for the West Antarctic rift system**, *Chemical geology*, June 25, 1997, 139(1-4), p.223-248, Refs. p.244-248.

Basaltic lavas were erupted from a 40-km long lineament near the Hobbs Coast of Marie Byrd Land, over the period from 11.7 m.y. to 2.3 m.y. ago. The lavas from the southernmost locality, Coleman Nunatak, are virtually constant in major, trace element and isotopic composition over this entire age span. From the other localities along the Hobbs Lineament, the earliest volcanism, which is coeval with that at Coleman Nunatak, is of shallower derivation. With time, the volcanism from these other localities progresses to greater depth and becomes lower in extent of melting (i.e., approaches the character of basalts from the Coleman locality). It is proposed that the HIMU mantle source was emplaced under Gondwana lithosphere prior to breakup, as a large weak plume head, with little or no accompanying volcanism. Likely mechanisms for the volcanism relate either to small-scale convection associated with strong basal topography of the lithosphere (such as that recorded by the Hobbs Lineament volcanism), or to emplacement of a new plume, which may in part be driving the extension. (Auth. mod.)

#### E-58001

Weaver, L., McLoughlin, S., Drinnan, A.N., **Fossil woods from the Upper Permian Bainmedart Coal Measures, northern Prince Charles Mountains, East Antarctica**, *AGSO journal of Australian geology and geophysics*, 1997, 16(5), p.655-676, 71 refs.

Upper Permian silicified gymnosperm woods from the Bainmedart Coal Measures (Amery Group) near Beaver Lake are described as two new species, *Australoxylon bainii* and *A. mondii*, on the basis of morphometric and qualitative characters—including ray anatomy, tracheid shape, and cross-field pit structure. *A. mondii* has two forms, one of which is characterized by a distinctive ray architecture comprising semidetached rows of ray cells with intervening gaps bridged by sporadic joins. Wood of *Vertebraria* could not be distinguished from *A. mondii* in microanatomical characters, which suggests that these two organ taxa may represent different parts of the same glossopterid plant. Many characters used traditionally in wood taxonomy could not be applied owing to substantial variation or preservational differences both within and between specimens. Three types of presumed biogenic cavities occur in the woods. Coprolite-containing cavities distributed in seasonal bands represent rare evidence for Permian wood-boring arthropods. Growth-ring analysis indicates a markedly seasonal climate with low to moderate interseasonal variation in wood production. (Auth. mod.)

#### E-58039

Bulichev, A.A., Gilod, D.A., Gladun, V.A., **Comparative analysis of the results of shipboard gravimetric observations and satellite altimetry data in the region of the Bouvet Island (the Subantarctic)**, *Moscow University. Geology bulletin*, 1996, 51(1), p.62-65, Translated from *Vestnik Moskovskogo Universiteta. Geologiya*. 2 refs.

In accordance with the Italian National Program of Investigations in the Antarctic during the period of Mar.-Apr., 1994, on a joint Russian-Italian 18th expedition aboard the *Academician N. Strakhov*, geological-geophysical investigations were carried out near Bouvet I. The geophysical investigations involved measurements of the gravitational field, which were made by means of a group of gravimeters. The accuracy of shipboard gravimetric observations corresponds to a scale of 1:500,000.

#### E-58042

Préndez, M., Muñoz, V., Villanueva, V., Montero, J.C., Godoy, J., **Chemical study of fresh waters from Fildes Peninsula** [Estudio químico de las aguas continentales de península Fildes, isla Rey Jorge, Antártica], *Santiago de Chile. Instituto Antártico Chileno. Serie científica*, 1996, No.46, p.9-29, In Spanish with English summary. 13 refs.

The chemical quality of the water of nine ponds on Fildes Peninsula, used or potentially suitable as drinking water, was studied. Modern analytical techniques, such as capillary electrophoresis for anions and mass spectrometry with inductively coupled plasma (ICP/MS) for trace elements, were used. Results show that the values of some trace elements are above the Chilean and the OMS regulations. The origins of these contaminations are discussed. Some recommendations for the management of water supply are presented. (Auth. mod.)

#### E-58050

Jagmin, N.I.B., **Nothofagoxylon sp. from King George I.** [*Nothofagoxylon* sp. del monte Zamek, isla Rey Jorge, islas Shetland del Sur, Antártica], *Santiago de Chile. Instituto Antártico Chileno. Serie científica*, 1996, No.46, p.133-141, In Spanish with English summary. 16 refs.

Tertiary fossil wood, collected at Zamek Mount on King George I. is described and illustrated. The cellular structure is well preserved and the main anatomical characteristics are growth-rings evident: diffuse-porous to semi-ring-porous, solitary and radial multiple vessels with perforation plate simple and abundant tyloses, intervacular pitting opposite, and terminal parenchyma. Rays are 1-2-3 cells wide, heterogeneous. The fossil wood is included in the Fagaceae family and in the *Nothofagoxylon* genus. (Auth.)

#### E-58055

Johnson, A.C., Von Frese, R.R.B., ADMAP Working Group, **Magnetic map will define Antarctica's structure**, *Eos*, May 6, 1997, 78(18), p.185, 2 refs.

A new, multinational, Antarctic Digital Magnetic Anomaly Project (ADMAP) has been launched to compile near-surface and satellite magnetic anomaly data into a digital map and database for the antarctic continent and surrounding oceans. The unified data set will be a powerful tool for determining the structure, geologic processes, and tectonic evolution of the continent.

#### E-58062

Johnson, A.C., **Cenozoic tectonic evolution of the Marguerite Bay area, Antarctic Peninsula, interpreted from geophysical data**, *Antarctic science*, Sep. 1997, 9(3), p.268-280, Refs. p.279-280.

Magnetic, gravity and bathymetric data from Marguerite Bay are used to study the relationships between oceanic and continental tectonic evolution in the arc and fore-arc of the Antarctic Peninsula. The data are used to redefine the crustal structure of the Marguerite Bay area, providing evidence for a northward continuation of George VI Sound and the Alexander I. Mesozoic accretionary prism almost to the continental shelf edge. A two-stage model of extension, associated with changes in spreading rates and approaching ridge segments, is proposed to explain the crustal structure and Cenozoic tectonic evolution of the area. The



model involves the opening of George VI trough by Tertiary dextral transtension, followed by oblique extension in an area bounded by the Tula and Adelaide fracture zones. This interpretation confirms previous work linking oceanic tectonic processes with continental arc and fore-arc structural development. (Auth.)

#### E-58063

McLoughlin, S., Lindström, S., Drinnan, A.N., **Gondwanan floristic and sedimentological trends during the Permian-Triassic transition: new evidence from the Amery Group, northern Prince Charles Mountains, East Antarctica**, *Antarctic science*, Sep. 1997, 9(3), p.281-298, Refs. p.295-298.

The Permian-Triassic boundary within the Amery Group of the Lambert Graben is placed at the contact between the Bainmedart Coal Measures and overlying Flagstone Bench Formation, based on the first regular occurrence of *Lunatisporites pellucidus* and the first appearance of *Aratrisporites* and *Lepidopteris* species. The Permian-Triassic boundary is marked by the extinction of glossopterid and cordaitalean gymnosperms, and by the disappearance or extreme decline of a range of gymnospermous and pteridophytic palynomorph groups. Earliest Triassic macrofloras and palynofloras of the Flagstone Bench Formation are dominated by peltasperms and lycophytes. Across Gondwana the diachronous disappearance of coal deposits and appearance of red-beds is suggestive of a response to shifting climatic belts. The abrupt and approximately synchronous replacement of plant groups at the Permian-Triassic boundary suggests that factors independent of, or additional to, climate change were responsible for the turnover in terrestrial floras. (Auth. mod.)

#### E-58064

Adamson, D.A., Mabin, M.C.G., Luly, J.G., **Holocene isostasy and late Cenozoic development of landforms including Beaver and Radok Lake basins in the Amery Oasis, Prince Charles Mountains, Antarctica**, *Antarctic science*, Sep. 1997, 9(3), p.299-306, 17 refs.

Geomorphological observations around the basin of Beaver Lake include an absence of raised shoreline features, the presence down to the present tidal limit of *in situ* ventifacts and residual landforms, the cliffed southern shoreline and adjacent shallow subhorizontal floor of Beaver Lake, and the composition of recent moraines on the basin's north eastern edge. This lack of Holocene uplift is consistent with low uplift rates observed from coastal oases of East Antarctica and suggests minor, rather than major, changes to the antarctic ice sheet during the most recent Quaternary glacial cycle. The formation of Beaver basin is attributed to Late Cenozoic glacial excavation by south flowing ice of the palaeo-Nemesis Glacier, initially eroding when relative sea level was higher than it is today. The basin containing Radok Lake was excavated by the palaeo-Battye Glacier probably when most effective during the numerous long cold periods of the Late Cenozoic. (Auth. mod.)

#### E-58066

Scrimgeour, I., Hand, M., **Metamorphic perspective on the Pan African overprint in the Amery area of Mac. Robertson Land, East Antarctica**, *Antarctic science*, Sep. 1997, 9(3), p.313-335, Refs. p.333-335.

The Amery area of Mac. Robertson Land lies between the early Palaeozoic granulite terrain of Prydz Bay and Meso-Neoproterozoic granulites in northern Prince Charles Mountains (nPCM). In contrast to the nPCM which shows an apparently simple near-isobaric history, granulites exposed in the Amery area contain reaction textures suggesting a more complex evolution. Peak- $M_1$  Mesoproterozoic assemblages formed at c. 700 MPa and 800°C and initially underwent a near-isobaric cooling. A subsequent increase in temperature ( $M_2$ ) resulted in the formation of cordierite-spinel assemblages at ca. 450 MPa and 700°C in metapelite. The timing of  $M_2$  is not firmly established, however existing data strongly suggest it is an early Palaeozoic event coeval with tectonism in Prydz Bay to the northeast. Thus the metamorphic evolution of granulites in the Amery area reflects a terrain-scale thermal interference pattern between two unrelated orogenic events. (Auth. mod.)

#### E-58067

Gore, D.B., **Blanketing snow and ice; constraints on radio-**

**carbon dating deglaciation in East Antarctic oases**, *Antarctic science*, Sep. 1997, 9(3), p.336-346, Refs. p.344-346.

Radiocarbon dating of marine, lacustrine or terrestrial biogenic deposits is the main technique used to determine when deglaciation of the oases of East Antarctica occurred. However, at many of the oases of East Antarctica, snow and ice presently form extensive blankets that fill valleys and some lake basins, cover perennial lake ice and in places overwhelm local topography to form ice domes up to hundreds of square kilometers in area. Field observations from Larsemann Hills and Taylor Is. suggest that under these conditions, terrestrial and lacustrine biogenic sedimentation is neither widespread nor abundant. If similar conditions prevailed in and around the oases immediately following retreat of the ice sheet, then a lengthy hiatus might exist between deglaciation and the onset of widespread or abundant biogenic sedimentation. As a result, radiocarbon dating might be a clumsy tool with which to reconstruct deglaciation history, and independent dating methods that record emergence of the hilltops from the continental ice must be employed as well. (Auth. mod.)

#### E-58075

Bölter, M., Blume, H.P., Kappen, L., **Soil biology and inorganic nutrients of King George and Windmill Islands. Part 1** [Bodenbiologische Untersuchungen in der maritimen und kontinentalen Antarktis (King George Island und Windmill Islands). Teil 1. Umweltparameter und anorganische Nährstoffe], *Polarforschung*, 1995 (Pub. 1997), 65(1), p.41-61, In German with English summary. Refs. p.58-61.

A comparative study was carried out on soils of the maritime and the continental Antarctic. Soil samples are described for surface layers (0-10 cm) by their *in situ* temperature profiles as well as by field and laboratory analyses of grain sizes, pH and nutrient contents. Active cryoturbation is a main factor of mixing processes in surfaces with high silt and clay content. In both regions processes of podzolization were recognized. Microclimatic conditions show the importance of small scale processes which are of special importance for freeze-thaw cycles. The distribution of nutrients and other inorganic components is rather homogeneous in regosols and leptosols. But in soils with organic top layers by lichen and moss cushions (crusts) accumulation occurs as well as displacement of metal ions into deeper layers (>10 cm). Histosols show patterns of brown soils. Special attention is given to the origin of nitrogen compounds. (Auth. mod.)

#### E-58089

Dickinson, W.W., Grapes, R.H., **Authigenic chabazite and implications for weathering in Sirius Group diamictite, Table Mountain, Dry Valleys, Antarctica**, *Journal of sedimentary research A*, Sep. 1997, 67(5), p.815-820, 40 refs.

Petrographic examination shows authigenic chabazite and calcite in the ice-free or weathering horizon of glacially deposited diamictites in the Sirius Group on Table Mountain. Some samples contain as much as 18% chabazite, which fills pores in matrix clays which are thought to have formed by repeated cycles of freezing and thawing during a warmer and wetter climate than the present. The presence of authigenic minerals in the Sirius suggests that chemical weathering is active and may take place in frozen ground along interfacial films of brine. Precipitation of the minerals is likely to occur at the boundary between the ice-free and ice-cemented horizons. As the ice cement sublimates, the film of brine becomes more concentrated until precipitation occurs in the process of efflorescence. Because the depth to the ice-cement boundary fluctuates in response to major climatic changes, authigenic minerals that mark the position of this boundary may be a proxy indicator of past climates. (Auth. mod.)

#### E-58099

Zhao, Y., Xu, C.H.,  **$^{210}\text{Pb}$  distribution characteristics in the lake sediment core at Great Wall Station, Antarctica**, *Chinese journal of polar science. Series No. 14*, June 1997, 8(1), p.33-36, 12 refs.

The results of  $^{210}\text{Pb}$  measurements in a lake sediment core from Antarctica are reported. The relative specific activities of  $^{210}\text{Pb}$  in the core were found to decrease exponentially with water depth. The sedimentation rate of the lake is about 0.072 cm/a. This paper shows that the



$^{210}\text{Pb}$  method is applicable to antarctic lake sediment studies, and that the 1960's atmospheric nuclear tests affected the rate of  $^{210}\text{Pb}$  deposition in Antarctica. (Auth. mod.)

#### E-58100

Hou, H.M., Wang, B.G., Tang, X.Z., Luo, Y.L., Zheng, H.H., **Environmental magnetic measurements of marine sediments from Antarctica: implications to paleoclimate changes during the past 15 ka**, *Chinese journal of polar science. Series No. 14*, June 1997, 8(1), p.37-47, Refs. p.46-47.

Systematic magnetic measurements of rocks collected in the Prydz Bay and at the Great Wall Station are reported; a sequence of paleoclimatic variations based on sediment-rock magnetic properties is established. Several paleoclimatic events, such as the Heinrich event 1, the Bolling-Allerod warm period and the Younger Dryas cold event, which occurred tens of thousands of y.a., are discussed.

#### E-58105

Armstrong, D.C., Willan, R.C.R., **Orthomagmatic quartz and post-magmatic carbonate veins in a reported porphyry copper deposit, Andean Intrusive Suite, Livingston Island, South Shetland Islands**, *Mineralium deposita*, 1996, Vol.31, p.290-306, Refs. p.305-306.

A previously reported porphyry Cu+Mo deposit in an Eocene pluton within the South Shetland Is. magmatic arc has been re-interpreted as 3 distinct hydrothermal assemblages. The oldest assemblage exsolved under confinement from the deep (ca. 6 km?) cooling magma whereas assemblages 2 and 3 formed during tectonic±magmatic episodes at depths of <1.5 km in the Late Cenozoic. Assemblage 1 comprises shallowly dipping sheets of aplite, biotite+tourmaline pegmatite, massive 'grey' quartz, and quartz+tourmaline+bornite+chalcopryrite+molybdenite veins. Assemblage 2 consists of steep, vuggy veins and country-rock breccias, with thick propylitic alteration selvages, cemented by microcrystalline quartz, complex intergrowths of FeMg carbonate, bladed barite and trace amounts of bornite and chalcopryrite. Assemblage 3 consists of thin, hematitic fault infillings formed during a second episode of brittle faulting. (Auth. mod.)

#### E-58106

Curtis, M.L., Storey, B.C., **Review of geological constraints on the pre-break-up position of the Ellsworth Mountains within Gondwana: implications for Weddell Sea evolution**, Weddell sea tectonics and Gondwana break-up. Edited by B.C. Storey, E.C. King and R.A. Livermore and Geological Society special publication No.108, London, Geological Society, 1996, p.11-30, Refs. p.26-30.

The Ellsworth-Whitmore mountains (EWM) crustal block possesses an anomalous structural and stratigraphic history relative to its neighboring West Antarctic crustal blocks, and the Transantarctic Mountains. Several geological features have been identified within the EWM as potential constraints on Gondwana reconstructions. These include a Grenvillian age basement devoid of mineral reset ages; an apparently continuous stratigraphic succession from Cambrian to Permian times; Middle-Upper Cambrian extension-related volcanic rocks; no Ross age deformation; and a dextral transpressive component to the Early Mesozoic Gondwanide deformation. Based on a consideration of these key geological features, and comparisons between the Ellsworth Mountains and the palaeo-Pacific margins of Gondwana, it is concluded that the EWM displays geological affinities with both the antarctic and South African margins, and that it was located outboard of both. A prerequisite of this conclusion is that rotation and translation of the EWM must be included in models of early Weddell Sea tectonic evolution. (Auth. mod.)

#### E-58108

Rebesco, M., Larter, R.D., Camerlenghi, A., Barker, P.F., **Giant sediment drifts on the continental rise west of the Antarctic Peninsula**, *Geo-marine letters*, 1996, Vol.16, p.65-75, 24 refs.

Multichannel seismic reflection profiles from the continental rise west of the Antarctic Peninsula between 63° and 69°S show the growth of eight very large mound-shaped sedimentary bodies. MCS profiles and

long-range side-scan sonar (GLORIA) images show the sea floor between mounds is traversed by channels originating in a dendritic pattern near the base of the continental slope. The mounds are interpreted as sediment drifts, constructed mainly from the fine-grained components of turbidity currents originating on the continental slope, entrained in a nepheloid layer within the ambient southwesterly bottom currents and redeposited downcurrent. (Auth.)

#### E-58130

Panter, K.S., Kyle, P.R., Smellie, J.L., **Petrogenesis of a phonolite-trachyte succession at Mount Sidley, Marie Byrd Land, Antarctica**, *Journal of petrology*, Sep. 1997, 38(9), p.1225-1253, Refs. p.1251-1253.

This paper presents geochemical data to examine the petrogenesis of phonolitic and trachytic magmas at Mt. Sidley. The objective is to determine the genetic relationships between silica-undersaturated and silica-saturated to -oversaturated rocks within the volcanic succession. Theoretical modeling of geochemical variations addresses both open and closed system processes and reveals a complex magmatic history involving variable degrees of mantle partial melting, magma mixing or mingling, fractional crystallization and crustal assimilation.

#### E-58151

Swanepoel, J.J.P., **Stratigraphy and sedimentology of the Ahlmannryggen Group in the Borgmassivet, western Dronning Maud Land**, *South African journal of antarctic research*, 1995, 25(1-2), p.17-50, With Afrikaans summary. Refs. p.40-41.

A new stratigraphic subdivision is proposed on the basis of 21 measured stratigraphic sections (at 20 localities in the Borg Massif and one in the Ahlmann Ridge) and on the application of the lithofacies concept. The following sedimentary structures are displayed: massive to poor bedding, planar bedding (upper flow regime), tabular and trough cross-bedding, ripple cross-lamination, wavy bedding and parallel bedding (lower flow regime). The composition of the sandstone is predominantly arkosic and the conglomeratic zones are lithic. Deposition took place in a tectonically controlled fluvial environment. Uplift of the source area, or subsidence of the depositional basin, alternating with tectonically stable periods, caused prograde and retrograde migration of the fluvial system. Depositional conditions fluctuated between the middle, sandy braided stream environment and the lower, meandering stream environment. (Auth. mod.)

#### E-58167

Yoon, H.I., Han, M.W., Park, B.K., Oh, J.K., Chang, S.K., **Glaciomarine sedimentation and palaeo-glacial setting of Maxwell Bay and its tributary embayment, Marian Cove, South Shetland Islands, West Antarctica**, *Marine geology*, Aug. 1997, 140(3-4), p.265-282, 46 refs.

High-resolution seismic profiles and piston cores were collected from Maxwell Bay and its tributary embayment, Marian Cove, during the Korea Antarctic Research Program (1992-93 and 1995-96) to elucidate the glaciomarine sedimentation processes and recent glacial history of the area. Sediment cores from the cover penetrated three distinct fining-upward lithofacies: basal till in the lower part of the core, accumulated just seaward of the grounding line of the tidewater glacier; interlaminated sand and mud in the middle part, deposited in ice-proximal zone by a combination of episodic subglacial meltwater inflow and iceberg dumping; and pebbly mud in the upper part, deposited in ice-distal zone by both surface meltwater plume and ice-rafting from the glacier front. (Auth. mod.)

#### E-58169

Zheng, X.S., Liu, J.Q., Hu, S.L., Sàbat, F.,  **$^{40}\text{Ar}/^{39}\text{Ar}$  ages and their geological significance of the volcanic rocks of Mount Bowles Formation in Livingston Island, South Shetland Islands**, *Chinese journal of polar research*, Mar. 1997, 9(1), p.28-34, In Chinese with English summary. 13 refs.

The isotopic ages of the volcanic rocks of the Mount Bowles Formation (MBF) outcropped on the eastern part of Livingston I. have been remeasured by  $^{40}\text{Ar}/^{39}\text{Ar}$  and laser microarea isochron age dating techniques. The results indicate that the isochron ages of 45D andesitic lava and 262 basaltic andesite are  $105.62 \pm 2.11$  Ma and  $111.48 \pm 2.23$  Ma,



respectively. The  $^{40}\text{Ar}/^{39}\text{Ar}$  plateau age of A9352 aplite is 96.7 Ma and the calculated isochron age is 96.6 Ma, which suggests that the aplite occurred after lava eruption. These new ages further verify that the MBF volcanic rocks were formed during Cretaceous. (Auth. mod.)

#### E-58170

Lu, B., Tang, Y.Q., Sui, L.R., Li, S.H., He, W.Q., **Aromatic compounds in surface sediments from Bransfield Strait, Antarctica**, *Chinese journal of polar research*, Mar. 1997, 9(1), p.44-52, In Chinese with English summary. 12 refs.

The characteristics of components and ring-number distribution of fluorescence aromatic compounds were studied by using gas chromatography and three-dimensional total scanning fluorescence. The aromatic compounds contain homologous series compounds of naphthalene, phenanthrene and fluorene. The amount of phenanthrene series is greater than that of other compounds. The next are the fluorene series compounds, of which the dibenzothiophen, alkyl-, and dialkyl- dibenzothiophen are 24%-61%. Results of the three-dimensional total scanning fluorescence indicates that the emission spectra of samples from Bransfield Strait are 350-450 nm, the ratios of  $T_4/T_0$  are 58%-67%, which is attributed to the predominance of more than five ring compounds. (Auth.)

#### E-58174

Li, Z.S., Wang, J., Lei, Z.H., Liang, X.M., Chen, X.D., Liang, Y.L., **Hydrochemical properties of lakes in Larsemann Hills, Antarctica**, *Chinese journal of polar research*, Mar. 1997, 9(1), p.71-77, In Chinese with English summary. 7 refs.

This paper presents data on hydrochemical properties of 13 lakes in Larsemann Hills.  $\text{Na}^+$  and  $\text{Cl}^-$  are predominant ions in the water, but no  $\text{CO}_3^{2-}$  is present. Hence, all lakes belong to  $\text{Na}^+$  group. The water contents of nutrient substance (N, P,  $\text{SiO}_2$ ) are rather low; inorganic nitrogen exists mainly in the form of  $\text{NH}_4^+-\text{N}$ , both in water and in the snow. The relatively high concentrations of  $\text{Na}^+$ ,  $\text{Cl}^-$  and  $\text{SO}_4^{2-}$  suggest that the precipitation in the Larsemann Hills is dominated by marine conditions. The contents of trace elements range from 0.01 to 2.0  $\mu\text{g/l}$ , which are approximately the same as those of the hydrosphere. (Auth. mod.)

#### E-58177

Wang, X.Z., Wu, S.G., Li, C.R., Chen, H.X., Luo, Y.L., **Surface textures of quartz grains from a core of the antarctic Prydz Bay**, *Chinese journal of polar research*, June 1997, 9(2), p.91-104, In Chinese with English summary. 5 refs.

Statistical analysis of the shapes and surface textures of quartz grains was carried out in 13 level samples of a core collected from a continental slope in Prydz Bay. Results show that the surface textures resulted from a strong glacial movement and a weak chemical erosion-precipitation, indicating that the sediments are glacial drifts from a low energy marine environment. The quantitatively obtained statistical results of the assemblages of the quartz-grain-surface textures, formed by the chemical erosion-precipitation, are well correlated with the analytical results of mineral X-ray diffraction and micropaleontology. (Auth. mod.)

#### E-58178

Duan, W.W., Li, X.J., Shen, Y.L., **Silica oxygen isotope of diatom from core PC10 in the Bransfield Strait, Antarctica**, *Chinese journal of polar research*, June 1997, 9(2), p.105-111, In Chinese with English summary. 12 refs.

Results from oxygen isotope analyses of 51 diatom samples from a Bransfield Strait piston core are presented. The  $\delta^{18}\text{O}$  values of 49 samples range from 35.32 to 24.30 per mill (SMOW). Results reveal that the 753 cm long sediments of the core recorded the deposition of this area during the last 112.5 kaB.P., representing oxygen isotope stages 1-5 and including one incomplete Glacial/Interglacial cycle and Postglacial period. The sedimentary rate in the Interglacial is higher than that in the Glacial. (Auth. mod.)

#### E-58179

Gu, S.C., Yan, W., **Preliminary study on the element strata and palaeoenvironment of core NP951 from the Prydz Bay**,

**Antarctica**, *Chinese journal of polar research*, June 1997, 9(2), p.112-118, In Chinese with English summary. Refs. p.117-118.

Characteristics of the element geochemistry of a Prydz Bay core, and its paleoenvironmental implications, are discussed. Results show the influence of the dissipation of the ice cover, and the influx of freshwater and terrigenous materials, on depositional processes. Paleoclimatic variations since the Late Epipleistocene are divided into 5 periods. Temperature changes, recorded at 145, 85 and 25 cm of the core, indicate respective climatic changes as follows: 14.4ka B.P., 10.3ka B.P., and 6.3ka B.P. It is concluded that the sudden change of the element content at 85 cm of the core marks the beginning of Holocene.

#### E-58180

Pen, W.S., Zheng, H.H., Wang, G.X., **Characteristics of mineral phase constituents and their environmental implication of lacustrine deposits from the Fildes Peninsula of King George Island, Antarctica**, *Chinese journal of polar research*, June 1997, 9(2), p.119-127, In Chinese with English summary. Refs. p.126-127.

Mineral phase constituents of lacustrine deposits from Fildes Peninsula resemble each other, but differ in their contents. Plagioclase (labradorite) is the main phase in primary minerals of the source-rock with less quartz; secondary minerals are mostly clay minerals. Among the latter, montmorillonite is dominant, followed by kaolinite. There is little difference in chemical compositions between lacustrine deposits and volcanic rocks. It is noted that the physical weathering of the parent rock is much stronger than the chemical weathering. The lacustrine deposit layer and glacial drift layer can be distinguished by the relation curves between the contents of kaolinite or calcite and their boundary ages. (Auth. mod.)

#### E-58183

Wang, G.N., Tao, J., Wu, X.Z., **Marine magnetic anomalies and deep geology of the Bransfield Strait, Antarctica**, *Chinese journal of polar research*, June 1997, 9(2), p.145-151, In Chinese with English summary. 8 refs.

Data on deep and shallow source anomalies of the 63S region reveal the following: 3 deep-source-anomaly belts related to the South Shetland Is., the Bransfield Strait and the Antarctic Peninsula; the north and south belts are positive, the one in between is negative; 2 shallow-source-anomaly belts are related to 2 faults on the northern and southern margins of the Bransfield Strait. Based on data on rock ages and seismic velocity distribution, the history of a westward drift of the Antarctic Peninsula is discussed.

#### E-58184

Liang, D.H., Chen, B.Y., **Research on gravity anomaly in Bransfield Basin, West Antarctica**, *Chinese journal of polar research*, June 1997, 9(2), p.152-157, In Chinese with English summary. 5 refs.

Data obtained by the Chinese vessel *Ocean IV* cruising in the Bransfield Strait in 1991, based on gravity measurements and seismic exploration, are discussed. It is proposed that the series of geological factors which led to the gravity anomaly can be divided into 3 parts: shallow, middle and deep. A Moho depth map of the Bransfield basin is presented.

#### E-58229

Kuehner, S.M., **Petrology and geochemistry of early Proterozoic high-Mg dykes from the Vestfold Hills, Antarctica**, Boninites, edited by A.J. Crawford, London, UK, Unwin Hyman, Ltd., 1989, p.208-231, 40 refs.

#### DLC QE462.B65B66 1989

The oldest undeformed mafic dykes in the Vestfold Hills are characterized by relatively high  $\text{SiO}_2$ ,  $\text{MgO}$ , Cr and Ni, and low  $\text{TiO}_2$  contents. The suite was emplaced at ca. 2400 Ma, directly following an amphibolite-granulite facies tectonothermal metamorphic event at ca. 2500 Ma. Chondrite-normalized plots of incompatible trace elements, major-element ratios and phase compositions divide the high-Mg suite into three distinct subgroups. Trace-element characteristics prohibit these subgroups from being related by crystal fractionation, and previous isotopic



studies preclude crustal contamination as a significant source of chemical variations. Major- and trace-element evaluation also indicates that two of the chemically distinct subgroups were derived from primitive liquids extracted from separate 'chondritic' upper-mantle sources, leaving olivine+orthopyroxene residues. Some selective trace-element contamination has been superimposed upon the chondritic characteristics. Comparison of an estimated parental liquid composition with experimental melting studies indicates that magma extraction took place at pressures of ca. 10 kbar (35 km), consistent with the geochemical signature indicating partial melting within a plagioclase-bearing mantle. (Auth. mod.)

#### E-58234

Gleason, J.D., Kring, D.A., Hill, D.H., Boynton, W.V., **Petrography and bulk chemistry of Martian orthopyroxenite ALH84001: implications for the origin of secondary carbonates**, *Geochimica et cosmochimica acta*, Aug. 1997, 61(16), p.3503-3512, 36 refs.

New petrologic and bulk geochemical data for the SNC-related (Martian) meteorite ALH84001 suggest a relatively simple igneous history overprinted by complex shock and hydrothermal processes. ALH84001 is an igneous orthopyroxene cumulate containing penetrative shock deformation textures and a few percent secondary extraterrestrial carbonates. Rare earth element (REE) patterns for several splits of the meteorite reveal substantial heterogeneity in REE abundances and significant fractionation of the REEs between crushed and uncrushed domains within the meteorite. Complex zoning in carbonates indicates nonequilibrium processes were involved in their formation, suggesting that CO<sub>2</sub>-rich fluids of variable composition infiltrated the rock while on Mars. Petrographic textures are interpreted as being consistent with an inorganic origin for the carbonate involving dissolution-replacement reactions between CO<sub>2</sub>-charged fluids and feldspathic glass in the meteorite. Carbonate formation clearly post-dated processes that last redistributed the REE in the meteorite. (Auth. mod.)

#### E-58235

Esser, R.P., McIntosh, W.C., Heizler, M.T., Kyle, P.R., **Excess argon in melt inclusions in zero-age anorthoclase feldspar from Mt. Erebus, Antarctica, as revealed by the <sup>40</sup>Ar/<sup>39</sup>Ar method**, *Geochimica et cosmochimica acta*, Sep. 1997, 61(18), p.3789-3801, 25 refs.

Argon released from the anorthoclase and the trapped melt inclusions can be distinguished by differences in their degassing behavior, allowing geologically more reasonable ages to be obtained. Melt inclusions exposed on the exterior of anorthoclase grains principally degas during furnace extraction at temperatures less than 1200°C. Inclusions entirely within anorthoclase grains principally degas at temperatures greater than 1200°C when incongruent melting of the anorthoclase allows melt inclusion hosted excess argon to escape. Anorthoclase aliquots prepared with less than 1% inclusions can be fitted with a plateau for heating steps below 1200°C to yield ages as young as 8 ka, whereas steps above 1200°C yield ages in excess of 100 ka. However, anorthoclase aliquots containing 10-30% melt inclusions yield ages in excess of 200 ka for heating steps below 1200°C. Minimizing the effects of the excess argon from melt inclusions relies on sample preparation and step-heating. Fine crushing and treatment with hydrofluoric acid removes many of the larger melt inclusions. Small melt inclusions which remain within the anorthoclase degas primarily at temperatures above 1200°C. Temperatures below 1200°C yield the most accurate ages. (Auth. mod.)

#### E-58236

Turner, G., Knott, S.F., Ash, R.D., Gilmour, J.D., **Ar-Ar chronology of the Martian meteorite ALH84001: evidence for the timing of the early bombardment of Mars**, *Geochimica et cosmochimica acta*, Sep. 1997, 61(18), p.3835-3850, 57 refs.

Ambiguities in the interpretation of <sup>39</sup>Ar recoil effects and in the contribution of Martian atmospheric <sup>40</sup>Ar lead to uncertainties in the Ar-Ar age which are difficult to quantify. It is suggested that the true value lies somewhere between 4,050 and 3,800 Ma. This age probably dates a period of annealing of the meteorite subsequent to the shock event which gave it its cataclastic texture. The experiments provide the first evidence of an event occurring on Mars coincident with the time of the late heavy

bombardment of the Moon and may reflect a similar period of bombardment in the Southern Highlands of Mars. Whether the age determined bears any relationship to the time of carbonate deposition in ALH84001 is not known. Such a link depends on whether the temperature associated with the metasomatic activity was sufficient to cause argon loss from the maskelynite and/or whether the metasomatism and metamorphism were linked in time through a common heat source. (Auth. mod.)

#### E-58238

Farquharson, G.W., **Lacustrine deltas in a Mesozoic alluvial sequence from Camp Hill, Antarctica**, *Sedimentology*, 1982, Vol.29, p.717-725, 38 refs.

Sedimentary rocks of late Mesozoic age exposed at Camp Hill represent deposition on a fault-controlled floodplain, with marginal alluvial fans, on a volcanic arc. Finely laminated mudstone and occasional graded laminae were deposited from suspension and by density underflow currents, respectively, in small shallow lakes. Thickening- and coarsening-upward sandstone bodies overlying the lake deposits are interpreted as lacustrine deltas of which 2 types are preserved: the Gilbert-type with steep foresets, and the mouth-bar type which lack steep foresets. Sections through the latter type reveal the presence of sub-environments characteristics of fluvial-dominated marine deltas. Abandoned mouth-bars resulting from avulsion are recognized. It is suggested that the processes which operated during formation of the mouth-bar deltas resulted from hyperpycnal flow. By contrast, the Gilbert-type delta is thought to be the consequence of a reduced inflow of suspended sediment causing homopycnal flow, and thorough mixing of the river and lake waters. (Auth. mod.)

#### E-58240

McGinnis, J.P., Hayes, D.E., Driscoll, N.W., **Sedimentary processes across the continental rise of the southern Antarctic Peninsula**, *Marine geology*, Sep. 1997, 141(1-4), p.91-109, 38 refs.

A series of large sediment mounds, identified along the Pacific portion of the Antarctic Peninsula continental rise are composed of sediment delivered to the continental rise during the advance and retreat of grounded ice across the shelf. The stratigraphic development of one of these sediment deposits, the Tula sediment mound, is examined to investigate how the onset of glaciation influenced the deep-sea depositional environment along this portion of the margin. Relating increased canyon cutting across the continental rise to the fluctuation of ice across the shelf implies that the onset of predominantly glacial conditions commenced soon after the onset of intensified bottom water circulation along this margin. (Auth. mod.)

#### E-58241

Barker, P.F., ed, Cooper, A.K., ed, **Geology and seismic stratigraphy of the antarctic margin, 2**, *American Geophysical Union. Antarctic research series*, 1997, Vol.71, 187p., Refs. passim. For individual papers see E-58242 through E-58244, E-58246 through E-58251, L-58245 or 52-1374 through 52-1382.

This is the second of two volumes in the American Geophysical Union's Antarctic Research Series to present contributions that provide a description of several regions of the antarctic continental margin, where the wedges of glacially derived sediment are particularly well developed and have been mapped in detail. The volume reflects the large amount of marine seismic data examined and interpreted. It also explores the additional information that will be required to help interpret the drill cores when they become available. Five papers use seismic and related acoustic data to describe the offshore depositional environment and the history of sedimentation over several million years, on the continental shelf and continental rise west of the Antarctic Peninsula. Other papers begin, or even anticipate, the direct sampling that should develop in the future.

#### E-58242

Larter, R.D., Rebesco, M., Vanneste, L.E., Gambôa, L.A.P., Barker, P.F., **Cenozoic tectonic, sedimentary and glacial history of the continental shelf west of Graham Land, Antarctic Peninsula**, *American Geophysical Union. Antarctic research series*, 1997, Vol.71, Geology and seismic stratigraphy of the antarctic margin, 2. Edited by P.F. Barker and A.K. Cooper, p.1-



27, Refs. p.24-27.

The combined seismic reflection data sets collected on 7 separate cruises provide constraints on several aspects of the tectonic, sedimentary and glacial history of the continental shelf west of Graham Land. Subduction ceased along this margin during the Tertiary as ridge-crest segments of the Antarctic-Phoenix ridge migrated into the trench. Seismic profiles show evidence of local uplift shortly after the arrival of a ridge-crest segment at the margin, followed by long-term subsidence. The maximum uplift was concentrated in a fairly narrow zone along a mid-shelf structural high. This high forms the seaward flank of a shelf sedimentary basin province. Most of the basin sediments appear to have been deposited before the latest phase of uplift along the high. On the seaward flank of the high there is an extensive prograded out shelf. This has developed mostly since the latest Miocene. Preservation of outer shelf "glacial-margin sequences", and the record of glacial history contained in them, has been favored by steady tectonic subsidence. (Auth. mod.)

#### E-58243

Rebesco, M., Larter, R.D., Barker, P.F., Camerlenghi, A., Vanneste, L.E., **History of sedimentation on the continental rise west of the Antarctic Peninsula**, *American Geophysical Union. Antarctic research series*, 1997, Vol.71, Geology and seismic stratigraphy of the antarctic margin, 2. Edited by P.F. Barker and A.K. Cooper, p.29-49, For the Extended abstract of this article see E-51898. Refs. p.46-49.

The authors reconstruct the history of sedimentation on the continental rise west of the Antarctic Peninsula Pacific margin, describing and interpreting the sedimentary processes that constructed 8 hemipelagic sediment drifts. During the Late Pleistocene, the drifts were maintained by deposition from southwest-flowing thermohaline bottom currents. These currents entrained the fine-grained components of turbidity currents generated as a result of small-scale instabilities on the upper continental slope of the glaciated Antarctic Peninsula margin. Turbidity current channels are confined to the lower slope and to the continental rise between the drifts. Three stages of evolution of the margin are recognized. The drifts on the continental rise reflect the onset of glacial progradation of the margin and contain a continuous and expanded record of Late Cenozoic antarctic glacial history. (Auth. mod.)

#### E-58244

Elliot, D.H., **Planar crest of Graham Land, northern Antarctic Peninsula: possible origins and timing of uplift**, *American Geophysical Union. Antarctic research series*, 1997, Vol.71, Geology and seismic stratigraphy of the antarctic margin, 2. Edited by P.F. Barker and A.K. Cooper, p.51-73, Refs. p.69-73.

Physiographically, the crest of the northern half of the Antarctic Peninsula is characterized by an elevated bedrock erosion surface that is capped by an ice carapace. The regional tectonic and magmatic history is interpreted to suggest that the erosion surface was formed either through the Late Cretaceous and Paleocene following the development of the Pacific-Antarctic Ridge, or in the Neogene following ridge crest-trench collision. In the former case, uplift may have occurred in the Late Paleogene following changes in subduction rate and prior to any extensive glaciation; the uplifted terrain would then have been the locus for ice growth and expansion. In the Neogene case, glaciation must have affected the formation of the surface, and rapid uplift would have occurred in Late Miocene through Pliocene time. In either case, differential movements must have occurred between the Cenozoic arc terrain and the Mesozoic terrain forming the uplifted erosion surface. On balance, Neogene uplift is considered more likely. (Auth. mod.)

#### E-58246

Nitsche, F.O., Gohl, K., Vanneste, K., Miller, H., **Seismic expression of glacially deposited sequences in the Bellingshausen and Amundsen Seas, West Antarctica**, *American Geophysical Union. Antarctic research series*, 1997, Vol.71, Geology and seismic stratigraphy of the antarctic margin, 2. Edited by P.F. Barker and A.K. Cooper, p.95-108, Refs. p.107-108.

As part of a reconnaissance survey of the West Antarctic continental margin, multichannel seismic data were acquired on the continental shelf, slope and rise of the Bellingshausen and Amundsen Seas in early 1994. Four lines extend across the outer shelf and slope to the continental rise, showing seismic sequences interpreted as having been produced by glacial and glacial-marine processes. Predominantly prograding sequences on the outer shelf and upper slope suggest that a grounded ice sheet advanced toward and across the shelf break several times during the glacial evolution of this region of Antarctica. Comparison of the profiles reveals that significant differences, but also striking similarities exist in the stratal patterns along the margin. Similar phases of progradation and aggradation observed on all of the profiles indicate a consistent long-term glacial development along the margin of the Amundsen and Bellingshausen Seas. (Auth. mod.)

#### E-58247

O'Brien, P.E., Leitchenkov, G., **Deglaciation of Prydz Bay, East Antarctica, based on echo sounding and topographic features**, *American Geophysical Union. Antarctic research series*, 1997, Vol.71, Geology and seismic stratigraphy of the antarctic margin, 2. Edited by P.F. Barker and A.K. Cooper, p.109-125, Refs. p.124-126.

Echo sounder, multichannel seismic and core data from Prydz Bay and the adjoining continental slope are used to define areas of different bed topography and acoustic character and to map bed features. Nine provinces are recognized, exhibiting different degrees of iceberg ploughing, basement outcrop, sculpting by the Lambert Glacier and sediment character. The ice deposited till on Four Ladies Bank, and transported material to the top of the Prydz Channel Fan via a deforming bed on the floor of Prydz Channel. With the onset of deglaciation and sea level rise, the ice stream flowing in Prydz Channel detached from its bed and its grounding line retreated rapidly to a series of retreat positions roughly parallel to flow, crossing Four Ladies Bank and the Amery Depression. The grounding line then retreated from the entire Amery Depression. Large moraines in the western part of the bay may represent Last Glacial Maximum moraines. The presence of iceberg scouring down to 690 m indicates ice keel ploughing while sea level was lower, either soon after ice retreat or during the Last Glacial Maximum. (Auth. mod.)

#### E-58248

Delisle, G., **Sub-ice topography in selected areas of Victoria Land, Antarctica: implications for its glacial erosion history**, *American Geophysical Union. Antarctic research series*, 1997, Vol.71, Geology and seismic stratigraphy of the antarctic margin, 2. Edited by P.F. Barker and A.K. Cooper, p.127-135, Refs. p.134-135.

Radar mapping of the sub-ice topography of several areas of Victoria Land has demonstrated deep subglacial valleys that trend in various directions. They are interpreted as the result of fluvial and glacial erosion, primarily active during the early Cenozoic and prior to large-scale antarctic glaciation. The onset of large scale ice flow from the interior of East Antarctica to the coast has not reshaped the previously developed sub-ice topography to a great extent. The current ice flow regime crosses the subglacial valleys at various angles without modifying them by glacial erosion because of cold-based conditions at the base. The sub-ice topographic maps suggest substantial vertical displacement along southwest-northeast faults, which appear to have evolved during block faulting of the coastal regions of Victoria Land. Since the Jurassic, a layer of at least 1700 m of post-Paleocene deposits appears to have been eroded from the coastal regions of Victoria Land and transported into the Ross Sea prior to the onset of the advance of the east antarctic ice sheet. (Auth. mod.)

#### E-58249

Brambati, A., et al, **Paleoenvironmental record in core ANTA91-30 (Drygalski Basin, Ross Sea, Antarctica)**, *American Geophysical Union. Antarctic research series*, 1997, Vol.71, Geology and seismic stratigraphy of the antarctic margin, 2. Edited by P.F. Barker and A.K. Cooper, p.137-151, Refs. p.149-151.



A paleoenvironmental reconstruction was carried out from physical, textural, mineralogical, chemical, radiometric and micropaleontological analyses of a sediment core collected in the Drygalski Basin, Ross Sea. Results indicate the presence of 2 main units. The lower one is a basal till, probably deposited during the last glacial maximum. The upper unit represents a complete post-glacial sedimentary sequence and is divided into 4 subunits, representing the decoupling of the ice sheet (proximity to the grounding line); an early glaciomarine (ice shelf) phase; a climatic change; and establishment of the present open marine conditions.  $^{14}\text{C}$  ages indicate that decoupling of the ice shelf started before 18.1 ka and that open marine conditions were established by almost 10.9 ka ago. (Auth.)

#### E-58250

Quilty, P.G., **Potential for better antarctic Neogene biostratigraphy**, *American Geophysical Union. Antarctic research series*, 1997, Vol.71, Geology and seismic stratigraphy of the antarctic margin, 2. Edited by P.F. Barker and A.K. Cooper, p.153-167, Refs. p.164-167.

Study of the antarctic Neogene suffers greatly from the lack of a diversity of biostratigraphic schemes compared with other parts of the world. Most microfossil groups are less diverse in the Antarctic than elsewhere, and a shallower CCD/lysocline reduces the usefulness of calcareous microfossils. While it is unlikely that a diversity of biostratigraphic schemes, comparable with that in more temperate climates, will ever evolve, there is scope for improvement on the current status. There is a need for examination of smaller microfossils and a search for fossilized remains of organisms that are not traditionally used elsewhere. Future sampling should be directed to recovering continuous sections with the specific aim of formulating new biostratigraphic schemes integrated with geochemical, geophysical and paleoenvironmental signals. (Auth. mod.)

#### E-58251

Powell, R.D., Alley, R.B., **Grounding-line systems: processes, glaciological inferences and the stratigraphic record**, *American Geophysical Union. Antarctic research series*, 1997, Vol.71, Geology and seismic stratigraphy of the antarctic margin, 2. Edited by P.F. Barker and A.K. Cooper, p.169-187, Refs. p.182-187.

Recent studies at grounding lines of modern marine-ending glaciers indicate deposits with different geometries may be produced in different glacial conditions. Depositional systems accumulating at grounding lines of modern temperate tidewater cliffs are positive topographic elements (morainal banks), whereas those at grounding lines of glaciers with polar ice ending as ice shelves appear to have wedge geometries (grounding-line wedges, diamicton aprons or "till deltas"). The apparent major control over these two end-members of grounding-line systems is subglacial meltwater. With abundant, free-flowing water, (and glacial freezing/refreezing processes), morainal banks appear to form; with smaller volumes of more confined water and deforming beds, grounding-line wedges appear to form. (Auth. mod.)

#### E-58261

Géli, L., et al, **Evolution of the Pacific-Antarctic Ridge south of the Udintsev Fracture Zone**, *Science*, Nov. 14, 1997, 278(5341), p.1281-1284, 17 refs.

Because of the proximity of the Euler poles of rotation of the Pacific and antarctic plates, small variations in plate kinematics are fully recorded in the axial morphology and in the geometry of the Pacific-Antarctic Ridge south of the Udintsev fracture zone. Swath bathymetry and magnetic data show that clockwise rotations of the relative motion between the Pacific and antarctic plates over the last 6 million years resulted in rift propagation or in the linkage of ridge segments, with transitions from transform faults to giant overlapping spreading centers. This bimodal axial rearrangement has propagated southward for the last 30 to 35 million years, leaving trails on the sea floor along a 1000-km-long V-shaped structure south of the Udintsev fracture zone. (Auth.)

#### E-58262

Gersonde, R., et al, **Geological record and reconstruction of the late Pliocene impact of the Eltanin asteroid in the south-**

**ern ocean**, *Nature*, Nov. 27, 1997, 390(6658), p.357-363, 35 refs.

In 1995, an expedition on board the research vessel FS *Polarstern* explored the impact site of the Eltanin asteroid in the southern ocean, the only known asteroid impact into a deep ocean basin. Analyses of the geological record of the impact region place the event in the Late Pliocene (ca. 2.15 Myr) and constrain the size of the asteroid to be >1 km. The explosive force inferred for this event places it at the threshold of impacts believed to have global consequences, and its study should therefore provide a baseline for the reconstruction and modelling of similar events, which are common on geological timescales. (Auth.)

#### E-58277

Domack, E.W., McClennen, C.E., **Accumulation of glacial marine sediments in fjords of the Antarctic Peninsula and their use as Late Holocene paleoenvironmental indicators**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.135-154, Refs. p.152-154.

#### DLC QH541.264.A6F67 1996

In order to focus upon changing paleoenvironmental conditions over the past several thousand years kasten cores from 3 fjords of the Antarctic Peninsula were selected for detailed sedimentologic and chronologic study. Sediments in Lallemand Fjord (a polar fjord with an ice shelf) accumulate at the rate of 1 to 2 mm/yr and are primarily terrigenous. Glacier-proximal deposits record the Late Holocene advance of the Müller Ice Shelf by an increase in eolian sand and a decrease in total organic carbon. Sediments in Andvord Bay (a sub-polar fjord) are accumulating at the rate of 1.5 to 1.8 mm/yr and are enriched in biogenic material (opaline silica and organic carbon) as a consequence of enhanced productivity. Cores from Brialmont Cove (a sub-polar fjord) are highly variable. Glacier-proximal sedimentation rates are on the order of at least 10-20 mm/yr. Characteristics of all fjord cores in the distal setting (>10 km) is a uniform content of ice rafted material indicating that little fluctuation in this component has taken place over the past several thousand years. (Auth. mod.)

#### E-58294

Tribaudino, M., Fioretti, A.M., Martignago, F., Molin, G., **Transmission electron microscope texture and crystal chemistry of coexisting ortho- and clinopyroxene in the Antarctic ureilite Frontier Mountain 90054: implications for thermal history**, *Meteoritics & planetary science*, Sep. 1997, 32(5), p.671-678, Refs. p.678.

Frontier Mountain (FRO) 90054 from Antarctica is a rare clino- and orthopyroxene-bearing ureilite with a coarse equigranular oriented texture; it is classified as a low-shock Ca-rich type. Transmission electron microscope (TEM) investigations were performed on clinopyroxene, orthopyroxene and pigeonite. The (100) twin lamellae in the clinopyroxene and intergrowth of clino- and orthoenstatite lamellae in orthopyroxene most probably originated by deformation. Exsolution was not observed in any of the phases, which suggests rapid cooling. Analysis by TEM also revealed interstitial Na-rich glass and pigeonite with sharp  $h+k$  odd reflections and rare stacking faults parallel to (100). Textural and crystal chemical data, obtained by TEM, indicated rapid cooling that was probably due to fast radiative heat loss as a result of the disintegration of the parent body into small fragments, which subsequently reassembled into a larger body. One or more collisional events caused fine-scale stacking faults and partial melting. (Auth. mod.)

#### E-58310

Magi, E., **Determination of trace metals complexed with humic acids in antarctic marine sediments**, *Chemical speciation and bioavailability*, June 1997, 9(2), p.67-70, 27 refs.

Humic acids play an important role in the solubility, mobility and accumulation of trace metals in marine environment. Nine sediment samples collected in Terra Nova Bay have been treated in order to extract the metal-humic acid complexes. The concentration of humic acids was measured by a spectrophotometric method while 5 trace metals, Cr, Cu, Mn, Ni and Zn were determined by means of an inductively coupled plasma atomic emission spectrometer (ICP-AES). The content of these



metals measured in the humic fraction in the sediment, except for Mn, showed a significant correlation to the amount of humic acids. Copper appeared to be the most accumulative element in humic acids. (Auth.)

### E-58317

Lindström, S., McLoughlin, S., Drinnan, A.N., **Intraspecific variation of taeniate bisaccate pollen within Permian glossopterid sporangia, from the Prince Charles Mountains, Antarctica**, *International journal of plant sciences*, Sep. 1997, 158(5), p.673-684, 49 refs.

Permineralized sporangia from Late Permian sediments of the Amery Group in the Prince Charles Mountains are assigned to *Arberiella* sp. cf. *A. africana* Pant and Nautiyal. They contain between 2000 and 3000 taeniate, saccate pollen grains that are predominantly haploxylonoid bisaccate and referable to the palynotaxon *Protohaploxypinus limpidus*. They also contain greater than 4% of diploxylonoid bisaccate forms comparable to *Striatopodocarpidites cancellatus* together with sporadic monosaccate and trisaccate grains. Morphometric analysis of *in situ* bisaccate pollen grains and taeniate bisaccate pollen in the dispersed palynoflora indicates that *in situ* grains occupy only the smaller end of the total size range. Their tendency to cluster into two different size groups may reflect differential predispersal expansion of the corpus. The *in situ* pollen grains are variable in most qualitative and quantitative features used for taxonomic discrimination of dispersed taeniate bisaccate pollen. (Auth. mod.)

### E-58322

Bérczi, S., Holba, Á., Lukács, B., **Evolution of chondritic parent bodies I: Correlation among ferrous components**, *Acta Mineralogica-petrographica*, 1995, Vol.36, p.143-152, 11 refs.

**DLC QE351.S9 Tomus 36 1995**

The thermal and chemical evolution of the precursors of chondritic meteorites are discussed by using the data of recent chemical analyses performed in the NIPR, Tokyo, Japan, mainly on antarctic meteorites. (Auth.)

### E-58332

Riley, T.R., Crame, J.A., Thomson, M.R.A., Cantrill, D.J., **Late Jurassic (Kimmeridgian-Tithonian) macrofossil assemblage from Jason Peninsula, Graham Land: evidence for a significant northward extension of the Latady Formation**, *Antarctic science*, Dec. 1997, 9(4), p.434-442, Refs. p.441-442.

New exposures of fossiliferous sedimentary rocks at Cape Framnes are assigned to the Middle-Late Jurassic Latady Formation of the southeastern Antarctic Peninsula region. A sequence of fine to coarse-grained sandstones of unknown thickness has yielded a molluscan and plant macrofossil assemblage rich in the following elements: perisphinctid ammonites, belemnopseid belemnites, oxytomid, trigoniid and astartid bivalves, and bennettitalean fronds and fructifications. The overwhelming age affinities are with the Kimmeridgian-early Tithonian part of the Latady Formation, as exposed on the Orville and Lassiter coasts. The Cape Framnes sedimentary rocks help to constrain the age of a major sequence of acid volcanic rocks on Jason Peninsula, and show that the Latady Basin was geographically much more extensive than recognized previously. It was the principal depositional center of Middle-Late Jurassic sedimentation in the Antarctic Peninsula back-arc region and in areal extent may have rivalled the essentially Cretaceous Larsen Basin. (Auth.)

### E-58333

Del Valle, R.A., Lirio, J.M., Lusky, J.C., Morelli, J.R., Nuñez, H.J., **Jurassic trees at Jason Peninsula, Antarctica**, *Antarctic science*, Dec. 1997, 9(4), p.443-444, 6 refs.

Since 1988, the Instituto Antártico Argentino (IAA) has been carrying out a research program to improve the geological and geographical knowledge of Jason Peninsula. During the 1994 and 1996 IAA winter expeditions, aimed at correlating sequences cropping out on the western part of Jason Peninsula, remains of petrified tree trunks were found within the isolated and poorly exposed sequences of volcanoclastic rocks cropping out at Brebbia and Ramfrez nunataks.

### E-58345

Salvini, F., Brancolini, G., Busetti, M., Storti, F., Mazzarini, F., Coren, F., **Cenozoic geodynamics of the Ross Sea region, Antarctica: crustal extension, intraplate strike-slip faulting, and tectonic inheritance**, *Journal of geophysical research*, Nov. 10, 1997, 102(B11), p.24,669-24,696, Refs. p.24,693-24,696.

An integrated study of onshore and offshore geology of the Ross Sea region has revealed a complex, post-Eocene tectonic framework. Regional NW-SE right-lateral, strike-slip faults are the outstanding feature of this framework. Variations in the deformational style across the region can be linked to corresponding variations in the bulk crustal rheology, from brittle behavior in the west, to ductile deformation near the Eastern Basin. The NW-SE faults cut almost continually from the Ross Sea to East Antarctica through lithospheric sectors with different rheology and thickness. The NW-SE faults link in the southern ocean with major transform faults related to the plate motions of Australia, New Zealand, and Antarctica. (Auth. mod.)

See also:

A-57487 A-57524 A-57525 A-57553 B-56373  
B-56385 B-56538 B-56652 B-56709 B-56863 B-56868  
B-57004 B-57098 B-57356 B-57423 B-57453 B-57547  
B-57640 B-57661 B-57725 B-57726 B-57739  
B-57761 B-57804 B-57810 B-57817 B-58134 B-58150  
B-58276 B-58302 C-56622 C-57380 F-56418 F-56448  
F-56476 F-56477 F-56479 F-56560 F-56605 F-56609  
F-56664 F-56681 F-56686 F-56760 F-56857 F-57085  
F-57205 F-57210 F-57506 F-57750 F-57801 F-57882  
F-57991 I-56526 I-56586 I-56767 I-56981 I-57125  
I-57126 I-57435 I-57436 I-57998 I-58071 I-58078  
J-56359 J-56380 J-56499 J-57035 J-57361 J-57399  
J-57401 J-57409 J-57411 J-57412 J-57539 J-57570  
J-57676 J-58331 K-56735 L-56358 L-56513 L-56514  
L-56515 L-56562 L-56582 L-56588 L-56895 L-56982  
L-57086 L-57269 L-57520 L-57521 L-57653 L-57771  
L-57828 L-57829 L-57830 L-57831 L-58080 L-58245  
M-57027



## F. ICE & SNOW

### F-56351

Hirasawa, N., Takahashi, A., Watanabe, O., Sato, N., **Report on workshop "Study of the Antarctic ice sheet and glacier using ERS-1/JERS-1 SAR data"**, *Antarctic record*, July 1996, 40(2), p.255-258, In Japanese with English summary. 3 refs.

The main purpose of the workshop was to discuss recent results of antarctic research using SAR data. The workshop was held on Feb. 6, 1996 at the National Institute of Polar Research; the number of participants was about 30. The contents of the workshop consisted of demonstration of various SAR images, comparison with pictures from an airplane and visible images, comparison with observational data on ice conditions, and discussion of problems in interferometry. (Auth. mod.)

### F-56360

Castelnau, O., Duval, P., Lebensohn, R.A., Canova, G.R., **Viscoplastic modeling of texture development in polycrystalline ice with a self-consistent approach: comparison with bound estimates**, *Journal of geophysical research*, June 10, 1996, 101(B6), p.13,851-13,868, 72 refs.

An anisotropic viscoplastic self-consistent (VPSC) approach is used for predicting texture development and mechanical behavior of polycrystalline ice. Results are compared with lower and upper bound estimations. It is assumed that ice crystals deform by basal, prismatic, and pyramidal slip. The resistance of each slip system is determined from experimental data on monocrystals and isotropic polycrystals. The VPSC model can predict the behavior of isotropic polycrystalline ice on both the macroscopic and microscopic scale. This is not the case for the lower and upper bounds. Fabrics simulated in uniaxial extension and compression are qualitatively similar for all models. However, large differences in the rate of fabric development are found. This is explained by the different interaction stiffness between grain and matrix. Fabric concentration obtained with the VPSC model for uniaxial deformation is in close agreement with those observed in polar ices. In simple shear, the single maximum fabric found *in situ* cannot be reproduced without an extensive (and probably unrealistic) activity of nonbasal systems. The preferential growth of grains well oriented for basal glide associated with rotation recrystallization could be at the origin of the discrepancy between model results and natural simple shear fabrics. Distorted grain shape slightly slows fabric development. Cores from several antarctic locations are used to explain this technique. (Auth. mod.)

### F-56381

Lanza, F., Bocci, F., Papoff, P., **Attempt to interpret the spread of element concentration in antarctic surface snow: the same element in a given test field, several elements in different sampling fields**, *Microchemical journal*, Nov. 1996, 54(4), p.429-443, 19 refs.

Sampling surface snow on a large test field always leads to a spread of analyte concentration data which depends on the nonuniformity of the air-snow interface in the field and on the extent of reproducibility of all the procedures used from sampling to analysis. Consequently a sample relevant to a restricted surface might be poorly representative of the surrounding area. Contamination of the sample during the gathering and storing steps is assumed to be the main source of nonrandom results (outliers). Using various statistical tools the authors were able to evaluate which part of the spread was due to the snow surface nonuniformity in the case of many samples collected in the same test field in Antarctica. In the case of samples gathered in different geographical areas, the possibility of finding correlations among points is greatly enhanced when three or more analytes are considered for each sample. When the same correlation is found for some analytes and a variable tentatively tested, information can be gained about the source of chemical content of snow samples. (Auth. mod.)

### F-56382

Johannessen, O.M., Wadhams, P., **Arctic and antarctic sea ice**

**and its interactions with ocean and the atmosphere**, Oceans and the Poles—European co-operation in ocean and polar research. 2nd edition, Strasbourg, European Science Foundation, Sep. 1993, p.30-33.

The effects of sea ice on ocean and atmospheric circulation and on the global heat budget and through this on world climate are not well understood. The lack of quantitative knowledge of the exchange processes between ocean, ice and atmosphere and on the seasonal variations in the total ice extent, thickness and structure of ice as well as in the amount of open water (polynyas and small leads) between the ice floes are key issues. Key scientific objectives relating to these issues are the following: field investigation of atmosphere-ice-ocean exchange processes from small to regional scales; and variation of the regional and global ice extent, its thickness distribution and open water within the ice pack as an indicator of climate change. (Auth. mod.)

### F-56383

Drewry, D.J., **Dynamics of large inland ice masses in Antarctica and Greenland**, Oceans and the Poles—European co-operation in ocean and polar research. 2nd edition, Strasbourg, European Science Foundation, Sep. 1993, p.48-53.

Global eustatic sea levels are controlled directly by the quantity of ice locked in the polar ice sheets: such ice masses have been the predominant influence on sea level over the last twenty million years and have involved height changes of between 50 and 150 m per glacial cycle. The critical links between ice masses and climate have become a major concern. Ice sheets do not simply respond to climate change but are active components; there are strong couplings between ice sheets, the atmosphere, oceans and the lithosphere. Ice sheets tend to interact with climate on long time scales. They contribute to thermal forcing of the atmosphere as a result of high surface albedo, act as a major source/sink of latent heat and have a stabilizing influence on the lower atmosphere. For the world's oceans the antarctic ice sheet, in particular, contributes dense, cold water from melting beneath floating ice shelves. (Auth. mod.)

### F-56390

Wohl, G.M., Bertoia, C.A., **Operational demonstration of ERS-1 SAR imagery at the Joint Ice Center**, MTS '92, Washington, D.C., Oct. 19-21, 1992. Proceedings. Global ocean partnership. Vol.2, Washington, D.C., Marine Technology Society, 1992, p.429-433, 4 refs.

### DLC GC2.M78 1992

The Navy/NOAA Joint Ice Center (JIC) was organized in 1976 to bring together Navy and NOAA resources for the analysis and forecasting of sea ice conditions on a global basis. The JIC is tasked with providing sea ice support to government, private and foreign users. Routine products include weekly sea ice analyses for the Arctic and Antarctic, thrice weekly analyses for the Alaskan and Great Lakes regions, 7 day and 30 day forecasts for the Arctic and seasonal outlooks for the Alaskan North Slope, Baffin Bay and western Ross Sea regions. Algorithm results are discussed with particular attention to future SAR applications to global sea ice analysis in the RADARSAT timeframe. (Auth. mod.)

### F-56418

Knight, P.G., **Glaciers**, *Progress in physical geography*, Sep. 1996, 20(3), p.345-350, 24 refs.

The behavior of large ice sheets in response to climate change is a key element in the global environmental system. Knowledge of the history of ice-sheet fluctuations is central to understanding past environmental change and predicting the possible consequences of future environmental change. For example, the antarctic ice sheet currently has enough water in cold storage that if it were to melt in response to predicted greenhouse warming it could raise world sea level by as much as 66 m. The stability of the antarctic ice sheet is thus a major research question in glaciology. A major potential source of information about its stability is the history of its



fluctuations in response to major environmental changes in the past. Over the last few years, the debate on this issue has focused closely on evidence from the Dry Valleys area of East Antarctica. Two contradictory hypotheses are at issue. One hypothesis proposes that the East Antarctic ice sheet has for much of its history been a highly dynamic feature, waxing and waning significantly in response to changing environmental conditions. The other hypothesis proposes that the ice sheet has existed as a stable feature in more or less its present state for at least the last 14 Ma. Evidence supports a model of partial deglaciation in Pliocene/early Pleistocene time, possibly with open seaways in the East Antarctic, followed by regrowth of East Antarctic ice sheet and substantial uplift of the Transantarctic Mountains. This paper discusses these hypotheses and other current glaciological research. (Auth. mod.)

#### F-56421

International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995, Hutter, K., ed, **Papers, *Annals of glaciology***, 1996, Vol.23, 410p., Refs. passim. Organized by the European Science Foundation (ESF) European Ice Sheet Modelling Initiative (EISMINT). For individual papers see 51-1843 through 51-1983 or E-56447, F-56422 through F-56434, F-56438, F-56440 through F-56446, F-56448 through F-56455, I-56435 through I-56437 and J-56439.

The 1995 International Symposium on Ice Sheet Modelling was organized by the European Science Foundation (ESF) program European Ice Sheet Modelling Initiative (EISMINT) and held in Chamonix, France on Sep. 18-22, 1995. There were 102 participants; 57 papers, 6 keynote talks and 24 poster papers were presented. About 60% of the presentations were submitted for publication in this volume; 34 of these are pertinent to Antarctica.

#### F-56422

Huybrechts, P., Payne, A.J., **EISMINT benchmarks for testing ice-sheet models**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.1-12, 24 refs.

A series of benchmark experiments designed for testing and comparing numerical ice-sheet models are presented. Following the outcome of two EISMINT workshops organized to intercompare large-scale ice-sheet models currently in operation, model benchmark experiments are described for ice sheets under fixed and moving margin conditions. These address both steady-state and time-dependent behavior under schematic boundary conditions and with prescribed physics. A comparison was made of each model's prediction of basic geophysical variables such as ice thickness, velocity and temperature. Consensus achieved in the model intercomparison provides reference solutions against which the accuracy and consistency of ice-sheet modelling codes can be assessed. (Auth.)

#### F-56423

Rommelaere, V., Ritz, C., **Thermomechanical model of ice-shelf flow**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.13-20, 23 refs.

An ice-shelf model which features efficient numerical techniques is developed to determine the back-force exerted by sides and pinning points, such as islands of an embayed ice shelf. The model is applied to three ideal geometries and shows that the restraint exerted by a small island, even far downstream from the grounding line, can represent about one-half of the total restraint due to the embayment. Results are further interpreted to suggest several criteria useful for testing any ice-shelf model. (Auth.)

#### F-56424

Budd, W.F., Warner, R.C., **Computer scheme for rapid calculations of balance-flux distributions**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.21-27, 21 refs.

A simple computer scheme developed by Budd and Smith (1985) and modified by D. Jenssen has been further developed to provide a rapid computation of steady-state balance fluxes over arbitrary ice masses, given the surface elevations and net accumulation distribution. The scheme pro-

vides a powerful diagnostic tool to examine the flux and state of balance over whole ice masses or limited regions to interpret field observations for dynamics or the state of balance. Applications are demonstrated for the whole of Antarctica and for regional areas. Comparisons are made between fluxes computed from observed ice thickness and velocities and those computed from balance. The observed ice thicknesses can also be used to compute surface velocities from assumed column-to-surface velocity ratios. The combined fluxes from observations and balance can be used to compute rates of change of elevation with time. (Auth. mod.)

#### F-56425

Salamatin, A.N., Ritz, C., **Simplified multi-scale model for predicting climatic variations of the ice-sheet surface elevation in central Antarctica**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.28-35, 26 refs.

The equation describing the surface evolution of a large ice sheet is examined on the basis of a scale analysis applied to antarctic conditions. Changes in the surface elevation are mainly driven by mass-balance fluctuations which approximately follow global atmospheric temperature variations. The dynamic interaction of the time-lagging interior with the quasi-stationary margin is described. As a result, a simplified model is deduced to simulate the surface-elevation variations in the central parts of the antarctic ice sheet caused by mass-balance perturbations corresponding to the main Milankovich cycles with the periods of 19-100 ky. The sensitivity of the model to physical factors (represented by dimensionless tuning parameters) is discussed. Climatically controlled variations of the ice-sheet thickness in the vicinity of Vostok Station during the past 200 ky are estimated. (Auth. mod.)

#### F-56426

MacAyeal, D.R., Rommelaere, V., Huybrechts, P., Hulbe, C.L., Determann, J., Ritz, C., **Ice-shelf model test based on the Ross Ice Shelf, Antarctica**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.46-51, 15 refs.

A standard numerical experiment featuring the Ross Ice Shelf is presented as a test package for the development and intercomparison of ice-shelf models. The emphasis of this package is solution of stress-equilibrium equations for an ice-shelf velocity consistent with present observations. As a demonstration, the authors compare 5 independently developed ice-shelf models based on finite-difference and finite-element methods. Results suggest that there is little difference between finite-element and finite-difference methods in capturing the basic, large-scale flow features of the ice shelf. Additionally they show that the fit between model and observed velocity depends strongly on the ice-shelf temperature field, for which there is presently little observational control. The main differences between model results are due to the equations being solved, the boundary conditions at the ice front and the discretization method (finite element vs finite difference). (Auth.)

#### F-56427

Chugunov, V.A., Vil'chinskii, A.V., **Modelling of a marine glacier and ice-sheet-ice-shelf transition zone based on asymptotic analysis**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.59-67, 13 refs.

All parts of a two-dimensional, isothermal, stationary marine glacier (grounded ice sheet, ice shelf and transition zone) with constant viscosity are analyzed by perturbation methods. In so doing, all zones of different flow patterns can be considered separately. Correlations between spatial scales for all parts can be expressed in terms of the typical ice-surface slope distant from the ocean, which reflects exterior conditions of the glacier's existence. In considering the ice-sheet-ice-shelf transition zone, a small parameter characterizing the difference between ice and water densities is used. Such an analysis allows us to find boundary conditions at the grounding line for the grounded ice mass. Glacier-surface profiles are determined by numerical methods. The grounding-line position found by using the boundary conditions derived in this paper differs from that obtained by using Thomas and Bentley's (1978) boundary conditions by about 10% of the grounded ice-stream length. (Auth.)



**F-56428**

Fowler, A.C., Johnson, C., **Ice-sheet surging and ice-stream formation**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.68-73, 13 refs.

A simplified model of ice-sheet behavior is described. It combines the assumptions of rapid ice flow, high viscous activation energy and realistic sediment-based sliding dynamics to form a non-linear diffusion-type equation which can display relaxation oscillations analogous to those of surging glaciers, and which may be relevant to large-scale surges of the Hudson Strait and Cabot Strait ice streams of the Laurentide ice sheet. When the physics of this model is applied to a laterally extensive unidirectional ice flow, such as that in the Siple Coast of Antarctica, an appropriate mechanism may exist for the spontaneous generation of ice streams. (Auth.)

**F-56429**

Hindmarsh, R.C.A., Payne, A.J., **Time-step limits for stable solutions of the ice-sheet equation**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.74-85, 15 refs.

Various spatial discretizations for the ice sheet are compared for accuracy against analytical solutions in one and two dimensions. The computational efficiency of various iterated and non-iterated marching schemes is compared. The stability properties of different marching schemes, with and without iterations on the non-linear equations, are compared. Newton-Raphson techniques permit the largest time steps. A new technique, which is based on the fact that the dynamics of unstable iterated maps contain information about where the unstable root lies, is shown to improve substantially the performance of Picard iteration at a negligible computational cost. (Auth.)

**F-56430**

Hindmarsh, R.C.A., **Stochastic perturbation of divide position**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.94-104, 23 refs.

Perturbation of divide position is considered by a linearization about the Vialov-Nye solution and also about related solutions with  $O(1)$  relief. Relaxation times of one-sixteenth the fundamental thickness/accumulation-rate time-scale are found for the Vialov-Nye configuration, while substantial basal topography can halve the rate of relaxation. Steady divide position is most sensitive to anti-symmetric accumulation-rate distributions near the divide, but transient divide motion is most strongly excited by anti-symmetric accumulation rate variations halfway between the margin and the divide. Relaxation times for the Antarctic Peninsula divide position are estimated to be around 200 years, while the larger Greenland ice sheet has a divide-position relaxation time of around 600 years. Modelling accumulation rate as a white-noise process permits analysis of divide perturbation as a (stochastic) Ornstein-Uhlenbeck process, where the standard deviation of the response is proportional to the standard deviation of the forcing. If observed accumulation-rate variability in the Antarctic Peninsula were anti-symmetric about the divide, it would be sufficient to force the divide position to fluctuate with standard deviation 10-20 times the depth of the ice sheet. (Auth. mod.)

**F-56431**

Hindmarsh, R.C.A., **Stability of ice rises and uncoupled marine ice sheets**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.105-115, 22 refs.

An analysis of the linear stability of marine ice sheets uncoupled from associated ice shelves is presented. The principal feature is a zero eigenvalue associated with infinitesimal shifts along the line of neutral equilibrium in phase space, termed the "equilibrium manifold". A finite-difference scheme is constructed which respects this stability property. The zero eigenvalue appears to allow modelling errors to accumulate rather than dissipate as occurs in land-based ice sheets. The practical significance of this is that even rather fine spatial grids may allow substantial numerical error to accumulate. (Auth.)

**F-56432**

Hvidberg, C.S., **Steady-state thermomechanical modelling of ice flow near the centre of large ice sheets with the finite-element technique**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.116-123, 30 refs.

A finite-element model is developed in order to calculate the coupled ice and heat flow and the surface topography in cold, steady-state ice sheets. The model decouples the heat-flow equation and the surface mass-balance condition from the rest of the equations and solves the problem by an iterative method. The model is used to examine the thermomechanics of ice divides. Initial studies of a symmetric, plane ice divide and an axisymmetric ice divide have led to the following conclusions, which are consistent with previous results. The ice-divide zone is a narrow region, only a few ice thicknesses wide, where the surface slope drops to zero and the flow solution changes. The longitudinal strain rate is high, especially in the upper layers, and the vertical velocity is smaller than away from the divide. This causes the basal temperatures to increase and the isochrones to rise. Divergent-flow conditions widen the ice-divide zone, whereas they do not influence the solution at the ice divide. (Auth.)

**F-56433**

Van der Veen, C.J., Whillans, I.M., **Model experiments on the evolution and stability of ice streams**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.129-137, 26 refs.

A simple model is developed based on the notion that on active ice streams the resistance to flow is partitioned between basal drag and lateral drag. The relative roles of these sources of resistance is determined by a friction parameter that effectively describes the strength of the bed under the ice stream. Reduction in the basal strength is caused by meltwater production, taken proportional to the product of basal drag and ice speed. The width of the ice stream is governed by the balance between entrainment or erosion of ice from the slow-moving inter-stream ridges and advection from the ridges into the ice stream. Entrainment of ridge ice is parameterized as a function of the shear stress at the lateral margins, in one case proportional to the lateral shear stress and in the second case scaled to ice-stream width. In the first formulation, the model rapidly becomes unstable but, using the second formulation, a steady state is reached with lateral drag providing all or most of the resistance to flow. The results point to the great importance of achieving an understanding of entrainment. With the second model and a wide range of parameter values, there is no cyclic behavior, with rapid flow being followed by a quiescent phase. (Auth.)

**F-56434**

Knap, W.H., Oerlemans, J., Cadée, M., **Climate sensitivity of the ice cap of King George Island, South Shetland Islands, Antarctica**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.154-159, 16 refs.

A two-dimensional vertically integrated ice-flow model has been used to simulate the current state of the ice cap of King George I. as well as the sensitivity of this state to climate change. The model was forced by an energy-balance model that generates the specific mass balance from climatological input data of two research stations. It was possible to simulate a steady-state ice cap whose volume and areal extent approximate the (estimated) current situation. Several experiments have indicated that this state is highly sensitive to climate change. The model predicts that cooling by 1 K will increase the ice volume by 10% and warming by 1 K will decrease it by 36%. A 10% change in precipitation will alter the ice volume by less than 8%. Application of the IPCC-90 Business-as-Usual scenario leads to a 55% reduction in the ice volume by the year 2100, compared to the present-day situation. The response of the ice cap to warming is therefore totally different from the response of the main antarctic ice sheet which is believed to gain mass by increasing temperatures. (Auth. mod.)

**F-56438**

Azuma, N., Goto-Azuma, K., **Anisotropic flow law for ice-sheet ice and its implications**, *Annals of glaciology*, 1996, Vol.23,



International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.202-208, 13 refs.

A new flow law for anisotropic polycrystalline ice is presented. The strain-rate tensor is related by a geometrical factor tensor ( $G$ ) to the stress tensor. The  $G$  factor tensor can be obtained from the  $c$ -axis fabric data and stress condition. This new flow law describes well the direction-dependent mechanical properties of anisotropic ice which cannot be demonstrated by Glen's flow law. For example, the new flow law can explain the fact that a strong single-maximum fabric ice, such as Dye 3 Wisconsin ice, can deform several times faster than isotropic ice under horizontal shear but can hardly deform under vertical or horizontal normal stress. The authors also show that at a deeper part of an ice sheet, where a single-maximum fabric develops, a positive vertical strain rate can be produced with only a horizontal shear stress. (Auth. mod.)

#### F-56440

Pattyn, F., **Numerical modelling of a fast-flowing outlet glacier: experiments with different basal conditions**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.237-246, 29 refs.

Recent observations in Shirase Drainage Basin, show that the ice sheet is thinning at the considerable rate of 0.5-1.0 m/a. Surface velocities in the stream area reach more than 2000 m/a, making Shirase Glacier one of the fastest-flowing glaciers in East Antarctica. A numerical investigation of the present stress field in Shirase Glacier shows the existence of a large transition zone 200 km in length where both shearing and stretching are of equal importance, followed by a stream zone of approximately 50 km, where stretching is the major deformation process. To improve insight into the present transient behavior of the ice-sheet system, a two-dimensional time-dependent flowline model has been developed, taking into account the ice-stream mechanics. Experiments were carried out with different basal motion conditions in order to understand their influence on the dynamic behavior of the ice sheet and the stream area in particular. Results revealed that when basal motion becomes the dominant deformation process, (partial) disintegration of the ice sheet is counteracted by colder basal-ice temperatures due to higher advection rates. This gives rise to a cyclic behavior in ice-sheet response and large changes in local imbalance values. (Auth. mod.)

#### F-56441

Li, J., Jacka, T.H., Budd, W.F., **Deformation rates in combined compression and shear for ice which is initially isotropic and after the development of strong anisotropy**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.247-252, 22 refs.

Laboratory-prepared fine-grained, initially isotropic polycrystalline ice samples were deformed under conditions of simple shear with simultaneous uniaxial compression at a constant temperature of  $-2.0^{\circ}\text{C}$ . The aim was to investigate the effects of stress configuration on the flow rate of initially isotropic ice and on ice with subsequent stress and strain-induced anisotropy. Experiments were carried out for various combinations of shear and compression with shear stress ranging from 0 to 0.49 MPa and compressive stress ranging from 0 to 0.98 MPa, but such that for every experiment the octahedral shear stress was 0.4 MPa. The strain curves resulting from the experiments clearly exhibit minimum strain rates while the ice is still isotropic, and steady-state tertiary strain rates along with the development of steady-state anisotropic fabric patterns. The present tests indicate that the enhancement factor for steady-state tertiary octahedral shear-strain rate depends on the shear or compression fraction and varies from about 10 for simple shear (with zero compression) to about 3 for uniaxial compression (with zero shear). (Auth. mod.)

#### F-56442

Meyssonier, J., Philip, A., **Model for the tangent viscous behaviour of anisotropic polar ice**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.253-261, 34 refs.

During the deformation of polar ice, a fabric develops which results in a macroscopically anisotropic behavior. Since the plastic anisotropy of the ice single crystal is very high, the effect of a strong (single maximum) fabric on the macroscopic flow law cannot be neglected when simulating the flow of an ice sheet. The authors propose to model polar ice as a transversely isotropic medium; while simplifying the problem, this captures the essential features of the *in-situ* observed fabrics. The macroscopic mechanical behavior of the ice polycrystal is obtained by using an orientation distribution function (ODF) for the  $c$ -axes of the grains, which characterizes the fabric, and a self-consistent scheme, considering each single crystal as transversely isotropic. The evolution of the ODF is described by a conservation equation. (Auth. mod.)

#### F-56443

Svendsen, B., Hutter, K., **Continuum approach for modelling induced anisotropy in glaciers and ice sheets**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.262-269, 16 refs.

This paper presents a formulation of a continuum model for so-called (stress or deformation) induced anisotropy in natural ice which, unlike computer-based Taylor-type models, can be incorporated in numerical simulations of large ice masses to account for the effects of this process on the flow of these bodies in a physical fashion. To do this, the authors treat natural ice as a rigid-elastic, non-linear inelastic material which can develop transverse isotropic behavior where the degree of such anisotropy at each point is controlled by the distribution of crystal glide-plane orientations there. This distribution is described by a so-called orientation-distribution function, for which an evolution relation can be derived. The central constitutive assumption of this formulation relates this distribution to the "structure" tensor representing the transverse isotropy of the material. On the basis of this relation, the model predicts in particular isotropic (e.g. classical Glen's flow-law type) behavior at a given point when the distribution of crystal glide-plane orientations is uniform there. (Auth.)

#### F-56444

Lawson, W., **Relative strengths of debris-laden basal ice and clean glacier ice: some evidence from Taylor Glacier, Antarctica**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.270-276, 12 refs.

An understanding of the mechanical behavior of the basal zone of an ice mass is fundamental to understanding the overall dynamics of that ice mass. Despite the fact that debris-laden ice is found in the basal zones of many glaciers and ice sheets, its mechanical behavior is only poorly understood. This paper attempts to expand the knowledge of the mechanical behavior of debris-laden ice by examining the uniaxial compressive strength of debris-laden basal ice sampled from the snout of the Taylor Glacier. At the relatively warm temperatures at which uniaxial compressive strength tests were conducted in the field, debris-laden ice was generally weaker than clean glacier ice. At these temperatures, between  $0^{\circ}$  and  $-5^{\circ}\text{C}$ , pressure melting was the dominant deformation mechanism in the debris-laden ice and cracking the dominant deformation mechanism in clean ice. At  $-25^{\circ}\text{C}$ , however, debris-laden ice reached higher strengths than the clean glacier ice and cracking was the dominant deformation mechanism in both ice types. Results suggest that the dynamic effects and significance of the presence of a debris-laden ice layer in the basal zone of an ice mass are likely to be highly variable in space and time. (Auth. mod.)

#### F-56445

Rémy, F., Ritz, C., Brisset, L., **Ice-sheet flow features and rheological parameters derived from precise altimetric topography**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.277-283, 31 refs.

For the first time high-quality coverage of the ERS-1 radar altimeter provides a very accurate surface topographic map covering 80% of the antarctic ice sheet that can contribute significantly to glaciological studies such as ice-sheet flow modelling. The topography allows estimation of the ice-flow direction, the balance velocity and the basal shear stress. A relationship between shear stress, basal temperature and a parameter related to strain rate helps in mapping the behavior anomalies of these parameters.



Longitudinal stress, sliding, bedrock topography and variation in the pre-exponential factor of the flow law are found to play a major role in the ice-flow pattern. This relation can also be used to estimate rheological parameters; the Glen exponent  $n$  is found to be 1 for  $T < -10^\circ\text{C}$  and 3-4 for higher temperatures, where  $Q$  is found to be 70 kJ/mol. (Auth.)

#### F-56446

Rist, M.A., Sammonds, P.R., Murrell, S.A.F., Meredith, P.G., Oerter, H., Doake, C.S.M., **Experimental fracture and mechanical properties of antarctic ice: preliminary results**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.284-292, 22 refs.

An experimental study of the fracture mechanics and rheology of ice from the Ronne Ice Shelf is currently being undertaken. The apparent critical stress-intensity factor (or apparent fracture toughness,  $K_Q$ ) for crack propagation has been measured using a three-point bend method for inducing crack growth perpendicular to the axis of cylindrical ice-core specimens. Tensile crack nucleation under applied uniaxial compressive stress has also been evaluated. Both methods have allowed a profile of ice elastic and fracture properties with depth through the ice shelf to be constructed. The resistance to fracture, as measured by changes in apparent fracture toughness and crack-nucleation stress, increases with depth right through the firm and meteoric ice layers. A simple fracture mechanics model applied to the Ronne Ice Shelf indicates that crevasses form from small surface cracks, less than 40 cm deep, which quickly grow to depths of 40-60 m and then remain stable. (Auth. mod.)

#### F-56448

Le Meur, E., Huybrechts, P., **Comparison of different ways of dealing with isostasy: examples from modelling the antarctic ice sheet during the last glacial cycle**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.309-317, 33 refs.

The bedrock isostatic response exerts a strong control on ice-sheet dynamics and is therefore always taken into account in ice-sheet models. This paper reviews the various methods normally used in the ice-sheet modelling community to deal with the bedrock response and compares these with a more sophisticated full-Earth model. Each of these bedrock treatments, five in total, is coupled with a three-dimensional thermomechanical ice-sheet model under the same forcing conditions to simulate the antarctic ice sheet during the last glacial cycle. The outputs of the simulations are compared on the basis of the time-dependent behavior for the total ice volume and the mean bedrock elevation during the cycle and of the present rate of uplift over Antarctica. This comparison confirms the necessity of accounting for the elastic bending of the lithosphere in order to yield realistic bedrock patterns. It furthermore demonstrates the deficiencies inherent to the diffusion equation in modelling the complex deformation within the mantle. This overview attempts to point out the main advantages and drawbacks of each of these methods and to determine which one is most appropriate depending on the specific modelling requirements. (Auth. mod.)

#### F-56449

Marshall, S.J., Clarke, G.K.C., **Sensitivity tests of coupled ice-sheet/ice-stream dynamics in the EISMINT experimental ice block**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.336-347, 16 refs.

A continuum mixture model of coupled ice-sheet/ice-stream dynamics has been developed within a conventional three-dimensional finite-difference model framework. The ice mass is areally divided into sheet-ice and stream-ice components. Dynamic evolution of each component is solved with coupling terms to describe mass exchange between flows. In this way, ice-stream fluxes can be incorporated in a rigorous dynamical model with only a doubling of computational cost. This paper presents simple model tests using the EISMINT experimental ice block, a 1500 x 1500 km ice sheet which rests on a flat bed. Ice-stream behavior is investigated for a range of coupling rules and activation scenarios. In simple tests

presented here, the authors find that the viscous response time and source ice feeding the ice stream may be a factor limiting ice-stream vigor and longevity. (Auth.)

#### F-56450

Saltzman, B., Verbitskii, M.I.A., **Heinrich-scale surge oscillations as an internal property of ice sheets**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.348-351, 11 refs.

A dynamical model governing the variations of ice-sheet volume, basal-water amount and ice-surge flux has been formulated in its simplest form, based on fundamental thermomechanical properties of ice sheets governing the basal-melting process. This model includes the effects of the geothermal flux, internal thermal advection and basal friction, the latter two factors being particularly important in regulating the bottom temperature and bringing it to the melting point, i.e. to a state vulnerable to catastrophic ice surges. It is shown that, for certain values of the unknown rate constants, such a model can exhibit oscillations on roughly the same scale as observed Heinrich events, even when external climatic changes are neglected, which would support the view that such events are an internal property of ice sheets. (Auth.)

#### F-56451

Bamber, J.L., Huybrechts, P., **Geometric boundary conditions for modelling the velocity field of the antarctic ice sheet**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.364-373, 23 refs.

This paper presents improved geometric boundary conditions (surface elevation and ice thickness) required as inputs to calculations of the surface-velocity field for the antarctic ice sheet. A comparison of the two-dimensional horizontal velocity field obtained on the basis of conservation of mass (balance velocity) with the diagnostic velocity field calculated with an ice-sheet model (dynamic velocity) may yield information on shortcomings in the way the ice-sheet model describes the ice flow. Here, the surface-elevation grid is described in detail, as it has been generated specifically for such a study and represents a new standard in accuracy and resolution for calculating surface slopes. The digital-elevation model was generated on a 10 km grid size from over 20,000,000 height estimates obtained from eight 35 d repeat cycles of ERS-1 radar-altimeter data. For surface slopes less than  $0.4^\circ$ , the accuracy is better than 1.5 m. In areas of high surface slope (coastal and mountainous regions), the altimeter measurements have been supplemented with data taken from the Antarctic Digital Database. South of  $81.5^\circ$ , data from the SPRI folio map have been used. The ice-thickness grid was produced from a combination of a redigitization of the SPRI folio and the original radio-echo-sounding flight lines. (Auth. mod.)

#### F-56452

Brisset, L., Rémy, F., **Antarctic topography and kilometre-scale roughness derived from ERS-1 altimetry**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.374-381, 19 refs.

The ERS-1 satellite has delivered altimetric data since 1992, enabling the authors to map most of the antarctic ice-sheet topography south to  $82^\circ\text{S}$  with better precision than all previous techniques. An algorithm has been developed such that the accuracy of the height data reaches the sub-meter level. As a first step, an inverse method has been designed to map the large-scale global topography, which is of interest to the study of the ice-sheet flow dynamics. As a second step, an adapted inverse algorithm displays precisely the short-scale undulations which are controlled by the bedrock below the ice. Finally, variations in the back-scattered altimetric signal allows to map directly the kilometer-scale roughness that is related to the basal-flow conditions. Together, these maps constitute an important database for modelling the ice sheet. (Auth.)

#### F-56453

Hansen, I., Greve, R., **Polythermal modelling of steady states of the antarctic ice sheet in comparison with the real world**, *Annals of glaciology*, 1996, Vol.23, International Symposium on



Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.382-387, 10 refs.

An approach to simulate the present antarctic ice sheet with respect to its thermomechanical behavior and the resulting features is made with the three-dimensional polythermal ice-sheet model designed by Greve and Hutter. It treats zones of cold and temperate ice as different materials with their own properties and dynamics. This is important because an underlying layer of temperate ice can influence the ice sheet as a whole, e.g. the cold ice may slide upon the less viscous binary ice-water mixture. Measurements indicate that the geothermal heat flux below the antarctic ice sheet appears to be remarkably higher than the standard value of 42 mW/m<sup>2</sup> that is usually applied for Precambrian shields in ice-sheet modelling. Since the extent of temperate ice at the base is highly dependent on this heat input from the lithosphere, an adequate choice is crucial for realistic simulations. The authors present a series of steady-state results with varied geothermal heat flux and demonstrate that the real ice-sheet topography can be reproduced fairly well with a value in the range 50-60 mW/m<sup>2</sup>. (Auth. mod.)

#### F-56454

Marmo, B.A., Dawson, J., **Movement and structural features observed in ice masses, Framnes Mountains, Mac. Robertson Land, East Antarctica**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.388-395, 6 refs.

Ice-movement surveys in the Framnes Mountains from austral summers 1993-94 and 1994-95 are presented with complementary surface elevations and structural interpretations. Surface velocities of 21 m/a have been recorded in Ice Stream B and 31 m/a in Ice Stream C. The flow rate varied between 11.6 and 21.0 m/a over a lateral range of 2.1 km west of Rumdoodle Peak and between 17.1 and 31.5 m/a over 2 km west of Mount Parsons. Two ice streams of relative high flow between the central Masson and David Ranges and several zones of incremental increase in flow rate have been identified within Ice Stream B, using shear-sense criteria based as ice-fracture geometry and subsequent deformation of crevasse traces. These zones of localized strain correlate with ice-flow survey measurements. (Auth.)

#### F-56455

Rowden-Rich, R.J.M., Wilson, C.J.L., **Models for strain localization in Law Dome, Antarctica**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.396-401, 21 refs.

A finite-element model was implemented that relates the computed flow to some field and fabric observations recorded on the Law Dome ice cap, East Antarctica. The results of the model suggest that the general ice flow is markedly affected by the bedrock topography. The zones of measured anomalous flow correlate with significant changes in the modelled stress within the ice mass. Stress increases of up to 50% above the reduced model shear stress were obtained in the models where the ice moved over a bedrock rise. Stress relaxation also occurs in the ice mass as the ice moves downward to a lee depression. There is a marked oscillation in the direction of principal stress and this is responsible for the progressive development of a set of high stress zones that are superimposed on the down-slope ice movement. (Auth.)

#### F-56461

Legrand, M., Delmas, R., **Polar ices chemistry: a past atmosphere reflection**, *La houille blanche*, 1995, No.5/6, p.116-122, With French summary. 41 refs. Presented at Colloque Glaciologie et nivologie: état des recherches et connaissances à la fin du XX<sup>e</sup> siècle (Symposium on Glaciology and Snow Science: State of the Art at the End of the 20th Century), Grenoble, France, Feb. 15-16, 1995.

A general review is presented of studies on impurities in ice cores from Greenland and Antarctica. Sulfate levels have increased over the last 200 years in both Greenland and Antarctica, at a faster rate in Greenland apparently due to increased burning of fossil fuels at high and mid northern latitudes, but with occasional peaks in Antarctica corresponding to volcanic eruptions elsewhere in the world. Despite the apparent increase of sulfates in recent decades, the Vostok ice core indicates that over the last

220,000 years, MSA (methanesulfonate) concentrations have been higher in colder periods. Sea salt and dust concentrations in both the Greenland and antarctic ice cores are higher in glacial than in warmer periods, likely due to strong winds.

#### F-56463

Castelnau, O., Duval, P., **Mechanical behavior of glacier ice** [Comportement mécanique des glaces de glaciers], *La houille blanche*, 1995, No.5/6, p.134-138, In French. 25 refs. Presented at Colloque Glaciologie et nivologie: état des recherches et connaissances à la fin du XX<sup>e</sup> siècle (Symposium on Glaciology and Snow Science: State of the Art at the End of the 20th Century), Grenoble, France, Feb. 15-16, 1995.

Models of the flow velocity and deformation of ice sheets, particularly in Antarctica and Greenland, are discussed. The models discussed include the VPSC (viscoplastic self-coherent) model, the Taylor homogeneous deformation model, and the homogeneous confined static model. The Vostok ice core indicates a vertical strain rate on the order of  $2.5 \times 10^{-13}$ /s. Data from both Greenland and Antarctica indicate that the recrystallization rate of grain size enlargement is  $10^{-17}$  m<sup>2</sup>/s at -50°C and  $10^{-15}$  m<sup>2</sup>/s at -10°C. In the models discussed, deformation is simulated at a strain rate of  $10^{-7}$ /s and a temperature of -10°C.

#### F-56464

Dang, H., Genthon, C., Martin, E., **Modeling of the polar snow cover** [Modélisation du manteau neigeux polaire], *La houille blanche*, 1996, No.5, p.62-65, In French. 11 refs. Presented at Colloque Glaciologie et nivologie: état des recherches et connaissances à la fin du XX<sup>e</sup> siècle (Symposium on Glaciology and Snow Science: State of the Art at the End of the 20th Century), Grenoble, France, Feb. 15-16, 1995.

A general discussion is presented of using the CROCUS snow model, originally developed at the Centre d'Études de la Neige (Snow Studies Center) in Saint-Martin-d'Hères, France, for avalanche forecasting, to simulate the evolution and atmospheric interaction of the snow cover at the South Pole. The model was tested with meteorological data from automatic weather stations in Antarctica archived at the European Centre for Medium-Range Weather Forecasts in Reading, England. The meteorological parameters of the model include air temperature, relative humidity, wind velocity, direct and diffuse incident solar radiation, incident infrared radiation, cloudiness, and quantity and type of precipitation. The model appears promising for applications in Antarctica.

#### F-56471

Drinkwater, M.R., Long, D.G., Early, D.S., **Enhanced-resolution ERS-1 scatterometer imaging of southern-ocean sea ice**, *ESA journal*, 1993, 17(4), p.307-322, 9 refs.

#### DLC TL787.E88c

A new method of image reconstruction is described which allows enhanced-resolution images to be produced from gridded C-band scatterometer data from the Active Microwave Instrument (AMI) carried by ESA's ERS-1 satellite. Resulting images are weekly averages which improve the nominal resolution of 50 km to an enhanced resolution of approximately 14 km. Time-integrated images are maps of the mean radar-backscatter coefficient normalized to 40° incidence. Such medium-scale images are derived for application to mapping the dynamics of the southern ocean sea-ice cover. These all-weather day and night images may be derived in regions of the globe from AMI scatterometer-mode data where higher resolution (25 m) AMI SAR image data are unavailable due to the lack of a local SAR receiving station, or during periods when the receiving station is closed. Results demonstrate that this enhanced-resolution imaging technique applied to the scatterometer mode of the AMI complements and considerably enhances the lower frequency temporal and spatial coverage of high-resolution SAR images in the Antarctic. (Auth.)

#### F-56476

Bhattacharya, B.B., Keramat, M., Raju, R.S., **Results of electromagnetic and electrical measurements in Antarctica**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.69-81, 10 refs.



**DLC G850.I53I53 1984**

Transient electromagnetic (TEM) soundings were carried out in Queen Maud Land region of Antarctica. Self-potential (SP) and vertical electrical sounding (VES) measurements were also made in the Schirmacher Ponds. The thickness of the ice shelf in Queen Maud Land is about 200 m. The thickness of the ice cap over the rocky terrain south of the Schirmacher Ponds increases rapidly and at the place of TEM sounding it is of the order of 400 m. Self-potential profiles do not show any characteristic anomaly. VES data reveal that the depth to fresh rock in the Ponds is less than 10 m. TEM method is recommended for determining the thickness of ice cover in Antarctica. (Auth. mod.)

**F-56477**

Verma, S.K., Mital, G.S., Dixit, M.M., Reddy, K.N.S., Venkatarayudu, M., Pantulu, K.P., **Seismic investigations on the ice-shelf near Dakshin Gangotri, Antarctica**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.83-91, 8 refs.

**DLC G850.I53I53 1984**

The results of the seismic investigations around the Dakshin Gangotri Station have established the efficacy of the seismic reflection methods in delineating sub-shelf structures. The results of the seismic interpretation, in conjunction with those obtained from magnetic studies, have led to the proposition of a structural model describing the thicknesses of ice shelf and underlying water and glacial sediment layers above the basement. This model explains a number of geomorphological features in the region. The experience gained in these first-ever seismic studies under the Indian Scientific Research Program in Antarctica also provides valuable information on the type of explosives and the recording media that are suitable in antarctic environs. (Auth.)

**F-56479**

Sangewar, C.V., **Some geological and glaciological observations during reconnaissance of the terrain south of Dakshin Gangotri Station, Antarctica**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.99-104.

**DLC G850.I53I53 1984**

During the course of reconnaissance of the terrain conditions south of Dakshin Gangotri Station, and possible vehicular route across Wohlthat Mountains further south, some observations of geological and glaciological interest were made enroute in addition to the performance appraisal of the snowmobiles. The efficiency of the vehicles under various terrain and ice conditions was studied. Exercises in establishing communication links between different locations during reconnaissance were also carried out. The surface features and secular changes in different types of the antarctic ice were recorded and glacio-geomorphological studies were carried out in the Schirmacher Ponds. Geological studies revealed the existence of olivine basalt, hornfels, pyroxenite and skarn rocks in the Skaly IGA nunatak area. (Auth.)

**F-56489**

Butkovskii, A.V., **Condensation coefficient of ice under laser sublimation near the melting point** [O vozmozhnosti eksperimental'nogo opredeleniia koeffitsienta kondensatsii l'da pri lazernoï sublimatsii vblizi tochki plavleniia], *Teplofizika vysokikh temperatur*, Oct. 1994, 32(5), p.793-797, In Russian. 11 refs.

**DLC QC276.T4**

Knowledge of the accurate condensation coefficients of water and ice is essential for modeling cloud formation processes. In addition, recent studies indicate that heterogeneous chemical reactions taking place on ice crystals play an important role in the formation of the ozone hole over the Antarctic. Here, a method is proposed which makes it possible to measure the condensation coefficient of ice near 0°C with an error of not more than 30% using relatively simple equipment.

**F-56549**

Ravindra, R., Dey, A., Beg, M.J., Kaul, M.K., **Observation on the snow accumulation/ablation over shelf and continental ice in**

**parts of central Dronning Maud Land, East Antarctica**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.227-238, 4 refs.

Snow accumulation and ablation patterns over shelf and continental ice in central parts of Queen Maud Land were studied during the summers of 1989-1991 and the winter of 1990. While there was negligible addition on the shelf ice near Dakshin Gangotri Station between Dec. 1989 and Mar. 1990, the period between Mar. and end of Oct. 1990 recorded a rise in accumulation of the order of 15.9 gm/cm<sup>2</sup>. Ablation of 10.3 gm/cm<sup>2</sup> was recorded in the summer of 1990-1991. A year-long profile of the snow surface between Maitri and Dakshin Gangotri stations has revealed a marked accumulation beyond the grounding line when compared to the area close to the Schirmacher Ponds. The stake data collected over the continental ice between Maitri Station and northern Humboldt Mountains has shown heavy accumulation (average 32.5 gm/cm<sup>2</sup>) during winter of 1990 and ablation of 7.4 gm/cm<sup>2</sup> in the 1st month of the following summer. (Auth. mod.)

**F-56550**

Ravindra, R., Shrivastava, V.K., Sharma, B.L., Dey, A., Bedi, A.K., **Monitoring of icebergs in antarctic waters and a note on the secular movement of Dakshin Gangotri glacier**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.239-249, 3 refs.

Iceberg monitoring in antarctic waters, during the Ninth Indian Antarctic Expedition, has revealed concentration of icebergs in two well defined zones. Distribution patterns and analyses of size-shape parameters have shown that the majority of large sized (>500 m), tabular icebergs are concentrated in the area close to the antarctic coastline, as compared to the pinnacled and/or disintegrating icebergs (of <500 m class) which show relative abundance between 51° and 60°S. A marked similarity in the distribution patterns of the icebergs during successive voyages has been noticed. Monitoring of the snout of Dakshin Gangotri glacier during austral summer of 1991 and its comparison with the results of earlier studies, reveals minor oscillation of the frontal part of the snout and the proglacial lake at its foot. (Auth.)

**F-56560**

Sugden, D., **Polar and glacial world**, Totowa, NJ, Barnes and Noble Books, 1987, p.214-231, In "Horizons in physical geography", edited by M.J. Clark, K.J. Gregory, and A.M. Gurnell. 7 refs.

**DLC GB54.5.H67 1987**

This review has focused on polar ice-sheets, whose inception and subsequent oscillations are the key to the creation and stability of today's polar environment. Oscillations of the ice-sheets which have characterized the Pleistocene Ice Age are the result of the amplification of orbitally induced cycles of solar radiation receipt. The response, which is complex, involves distinct ice-sheet components whose size and location determines their response to different limiting variables. Most progress in understanding ice-sheets has occurred in the last thirty years, based on the large-scale approach, the bold use of hypotheses, explicit use of assumptions and an interdisciplinary outlook. Both the intellectual and practical importance of the subject, and the freshness of its approach, fully justify its recognition as one of the highlights of physical geography over the past two decades.

**F-56565**

Crane, D., Wadhams, P., **Sea-ice motion in the Weddell Sea from drifting-buoy and AVHRR data**, *Journal of glaciology*, 1996, 42(141), p.249-254, 15 refs.

A study of sea ice in the northern Weddell Sea was done, relating the ice motion, determined using an array of satellite-tracked drifters, deployed into ice floes, to parameters describing the nature of the ice cover, obtained from an analysis of Advanced Very High Resolution Radiometer imagery. It was found that the ice motion was predominantly wind-driven, responding to the passage of low-pressure systems across the area. The nature of the ice motion was found to depend upon the lead parameters, with low values of pure convergence and divergence and larger values of vorticity and deformation of the ice field. The vorticity



was found to be well correlated with the atmospheric pressure, with a time lag of less than 3 h, implying an almost instantaneous response of the ice cover to meteorological forcing. (Auth. mod.)

#### F-56566

Winther, J.G., Elvehøy, H., Bøggild, C.E., Sand, K., Liston, G., **Melting, runoff and the formation of frozen lakes in a mixed snow and blue-ice field in Dronning Maud Land, Antarctica**, *Journal of glaciology*, 1996, 42(141), p.271-278, 18 refs.

Large-scale melting phenomena such as meltwater drainage channels and meltwater accumulation basins or frozen lakes were surveyed on the land ice mass in Jutulgryta, Queen Maud Land, during the Norwegian Antarctic Research Expedition in 1989-90. The largest frozen lake that was observed was close to 1 km in width. These melting features were also detected in a Landsat Thematic Mapper image recorded on Feb. 12, 1990. Then, during 1993-94, a 5-year glaciological program was started in this area. In spite of negative air temperatures and the presence of a frozen ice surface, sub-surface melting and runoff were found within the uppermost meter in blue-ice fields. The subsurface melting is a consequence of solar radiative penetration and absorption within the ice, i.e. the "solid-state-greenhouse effect". Temperatures in blue ice were about 6°C higher than for snow. Studies of how melting features change with time can be valuable indicators of climate change. This ongoing program identifies the importance of analyzing how these melting features originate, of mapping their present areal distribution, of determining how sensitive they are to climate change and of studying changes in the past and possible changes in the future. (Auth. mod.)

#### F-56569

Arcone, S.A., **High resolution of glacial ice stratigraphy: a ground-penetrating radar study of Pegasus Runway, McMurdo Station, Antarctica**, *Geophysics*, Nov.-Dec. 1996, 61(6), p.1653-1663, 31 refs.

Ground-penetrating radar has been used to detect areas of present or potential structural weakness beneath a 3.2 km snow-covered ice runway on the Ross Ice Shelf. The data show many horizons up to tens of meters long and occurring to about a 9 m depth, below which a brine intrusion limits penetration. The presence of porous ice or dispersed water is interpreted from wavelet phase. The water may be associated with apparent deepening and fading of the brine horizon. If the above interpretation is correct, water occurs at depths to 3.5 m and extends as much as 40 m horizontally, which is greater and deeper than known previously. Migration of the diffractions with a single-layer migration scheme shows all horizons above the brine layer to be small dielectric perturbations within the ice. (Auth. mod.)

#### F-56581

Pursell, C.J., Conyers, J., Denison, C., **Photochemistry of chlorine dioxide in polycrystalline ice (T=140—185 K): production of chloryl chloride, Cl—(OCIO)**, *Journal of physical chemistry*, Sep. 19, 1996, 100(38), p.15450-15453, 17 refs.

In a simulation pertinent to antarctic ozone depletion the photochemistry of chlorine dioxide, OCIO, in polycrystalline ice has been investigated at T=140-185 K using FTIR and UV-vis spectroscopy. Photolysis with ultraviolet light at 360 nm produced chloryl chloride, Cl-(OCIO). The proposed mechanism for the formation of Cl-(OCIO) involves photolysis of OCIO to Cl+O<sub>2</sub> followed by migration of the Cl to a nonphotolyzed OCIO. While clustering of the OCIO may play a role in the formation of the product, experimental evidence indicates that the OCIO prefers to exist as a monomer solvated by the water. These results have potential implications for stratospheric ozone loss: under the very dilute conditions that would exist on polar stratospheric ice particles, the photochemical conversion of OCIO to Cl+O<sub>2</sub> would represent a new source of Cl atoms for ozone depletion. (Auth. mod.)

#### F-56599

Jain, S.C., Dhar, R., Reddy, K.N.S., **Magnetic and seismic investigations on the ice-shelf around the Indian permanent station in Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.151-155, 4 refs.

DLC G850.I53 I53

Results of magnetic and seismic investigations around the Dakshin Gangotri Station have established the usefulness of geophysical tools in delineating sub-shelf structures. Of the explosives tried so far for selecting a suitable energy source for seismic studies, Low Temperature Plastic Explosives (LTPE) developed by ERDL, Pashan, were found to be the best under sub-zero climatic conditions of Antarctica. (Auth.)

#### F-56601

Nijampurkar, V.N., Bhattacharya, S.K., Mukerji, S., Singh, R.K., Srivastava, D., **Oxygen isotope studies in Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.171-179, 8 refs.

DLC G850.I53 I53

δ<sup>18</sup>O measurements of fresh snow, surface ice, shallow ice cores, old ice from the Maitree glacier and fresh water lakes from Schirmacher Ponds and Wohlthat Mountains have been carried out. The mean δ<sup>18</sup>O values in fresh snow and surface are around -19 per mill; the old glacier ice and mean values of 18 lake ice samples were -42 and -26 per mill, respectively. The mean annual surface air temperature precipitation of fresh snow and surface ice samples is calculated to be -7°C. The mean values of -19 per mill in fresh snow/ice, -26 per mill in Schirmacher Hills and -42 per mill in old ice of Maitree glacier suggest that the Schirmacher Lakes receive 70% contribution from fresh snow/ice meltwater and about 30% from Maitree glacier old ice meltwater. No systematic cyclic variations have been observed in the 3 shallow ice cores collected from the shelf ice and iceberg. (Auth.)

#### F-56602

Nijampurkar, V.N., Rao, D.K., **Polar fallout of radioisotopes <sup>32</sup>Si, <sup>7</sup>Be, <sup>210</sup>Pb, <sup>137</sup>Cs and <sup>239</sup>Pu at Dakshin Gangotri, Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.181-188, 16 refs.

DLC G850.I53 I53

Radioisotope concentrations were measured in snow samples of the shelf ice near Dakshin Gangotri Station. The annual fallout of cosmic ray produced <sup>32</sup>Si—the first measurement of its kind in Antarctica—is estimated to be 3 x 10<sup>-5</sup> dpm/cm<sup>2</sup>/yr, which corresponds to the global production rate of <sup>32</sup>Si to be 0.8 x 10<sup>-4</sup> atoms/cm<sup>2</sup>/sec, using half-life of <sup>32</sup>Si to be 140 years. This estimate is lower than that calculated by Lal and Peters (1967) which suggests that the life of <sup>32</sup>Si is closer to 270 yrs as observed by geophysical methods. The fallout of the other natural radioisotope <sup>7</sup>Be and <sup>210</sup>Pb are consistent with the earlier work. As expected, the fallout of artificial radioisotopes <sup>137</sup>Cs and <sup>239</sup>Pu are an order of magnitude lower than the peak production during the nuclear explosions tests conducted during the last 3 decades. (Auth.)

#### F-56603

Singh, R.K., Mukerji, S., Srivastava, D., Kaul, M.K., **Snow accumulation and ablation pattern on ice shelf near Dakshin Gangotri, Antarctica, and development of fast ice off Dakshin Gangotri**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.189-204, 2 refs.

DLC G850.I53 I53

Variations in the accumulation and ablation patterns of snow of the shelf ice around Dakshin Gangotri Station defined by the wind direction and wind force were studied in the summers of 1985-86 and 1986-87 and in the intervening winter period. The net accumulation of snow/firn recorded was of the order of 18.51 gm/cm<sup>2</sup> of water equivalent in a calendar year. The average density of snow/firn was 0.37 gm/cm<sup>3</sup>. Maximum development of fast ice was observed in the month of Jan. 1987 and its average density was recorded as 0.50 gm/cm<sup>3</sup>. The maximum ram hardness was of the order of 37 kg. (Auth. mod.)

#### F-56604

Kaul, M.K., Singh, R.K., Srivastava, D., Mukerji, S., Jayaram, S., **Observations on the changes in the snout of Dakshin Gangotri Glacier, Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India,



Department of Ocean Development, 1988, p.205-209, 1 ref.

**DLC G850.I53 I53**

A small polar ice tongue, named Dakshin Gangotri Glacier during the Second Indian Expedition to Antarctica (1982-83), was studied to determine any secular movement the glacier has undergone since 1983. Repeat mapping of the snout was carried out by EDM (electronic distance measuring unit) in 1986 and 1987. Results obtained are compared to those obtained during earlier studies. (Auth.)

**F-56605**

Srivastava, D., Kaul, M.K., Singh, R.K., Mukerji, S., Jayaram, S., **Some observations on the glacial geomorphological features of Wohlthat Mountains, central Queen Maud Land, Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.211-218, 3 refs.

**DLC G850.I53 I53**

The part of central Queen Maud Land, at the Dakshin Gangotri Station's shelf and about 200 km inland, encompasses four distinct geomorphological units: the shelf area, the piedmont zone, the mountain barrier and the polar ice plateau. Glacial geomorphological features of the mountain barrier, formed by the Wohlthat Mountains, were studied during the Fifth Indian Expedition to Antarctica and are described in this paper. The prominent features include the differential relief, various types of moraines, wind scoops and desert weathering (honeycomb features). Level of glaciation has been inferred and several features associated with deglaciation are described. (Auth.)

**F-56606**

Nijampurkar, V.N., **Glaciochemical studies in Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.219-224, 10 refs.

**DLC G850.I53 I53**

Concentrations of some major ions (Na, K, Cl) and heavy metals (Fe, Co, Ni, Ca, Mg, Zn, Cu, Pb and Cd) of 10 snow, ice and lake water samples collected near Dakshin Gangotri Station were determined. The concentrations of major ions are normalized to Na. These ratios, similar to those of seawater, indicate that the snow/ice/lake water samples are influenced by marine salts. High Cl/Na ratios were found in Maitree glacier ice and Wohlthat lake water. The concentrations of heavy metals Zn, Cu, Pb, Cd, Co, Ni were below the detection limit indicating no significant anthropogenic contribution in the region investigated. (Auth. mod.)

**F-56607**

Nijampurkar, V.N., Rao, D.K., Kaul, M.K., Mukerji, S., Singh, R.K., Srivastava, D., **Radioactivity studies in Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.225-233, 6 refs.

**DLC G850.I53 I53**

The variation of  $^7\text{Be}$ ,  $^{210}\text{Pb}$ ,  $^{137}\text{Cs}$  and total beta activity has been studied in antarctic shallow ice core samples (up to 9 m depth), fresh snow, surface ice samples and fresh lakewater samples collected near the Dakshin Gangotri Station. Based on the  $^{210}\text{Pb}$ ,  $^{137}\text{Cs}$  and total beta activity measurements in shallow ice core samples, past accumulation rate of snow has been estimated to be  $13.5 \text{ g/cm}^2/\text{yr}$  ( $0.3 \text{ m/yr}$ ). (Auth.)

**F-56608**

Srivastava, D., Kaul, M.K., Singh, R.K., Mukerji, S., Jayaram, S., **Glacier inventory of Wohlthat Mountain chain, Queen Maud Land, Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.235-245, 3 refs.

**DLC G850.I53 I53**

The paper summarizes the results of glacier surveys carried out in the Wohlthat Mountains lying between  $9^\circ\text{-}14^\circ\text{E}$  and  $71^\circ10'\text{-}72^\circ\text{S}$ . The inventory is based on a 1:250,000 scale topographic map, Landsat imagery, reconnaissance vertical aerial photography during 1985-86 expedition, and limited ground checks. A total of 122 glaciers have been identified, numbered and classified. (Auth.)

**F-56609**

Kaul, M.K., Singh, R.K., Srivastava, D., Mukerji, S., Jayaram, S., **Ice flow conditions in the ice sheet draining part of the central Queen Maud Land, East Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.247-256, 4 refs.

**DLC G850.I53 I53**

The present-day ice flow conditions of central Queen Maud Land have been studied to determine the dynamics of this segment of antarctic ice sheet. The flow direction of the inland polar ice, as observed in the field, and the location of the grounding line is demarcated, based on surface studies. Coordination of 4 stakes fixed on the margin of the inland ice on experimental basis, has revealed movement of the ice varying from a minimum of 0.031 m to a maximum of 1.91 m per day, based on 1-year observations. The outline of a part of shelf ice surveyed (Jan.-Feb. 1986) and compared with the satellite imagery of 1975, shows very little change. (Auth. mod.)

**F-56662**

Abyzov, S.S., et al, **Glaciological and microbiological description of the ice core in central Antarctica**, *Biology bulletin*, Sep.-Oct. 1996, 22(5), p.441-446, Translated from Rossiiskaia akademiia nauk. Izvestiia. Serii biologicheskaya. 26 refs.

The search for microorganisms in anabiosis at a constant temperature below zero is of great interest. Nevertheless, the ice core in central Antarctica has been neglected by microbiologists. Here are presented the results of a complex glaciological and microbiological investigation of the ice core in the region of Vostok Station. (Auth. mod.)

**F-56663**

Squire, V.A., Hosking, R.J., Kerr, A.D., Langhorne, P.J., **Moving loads on ice plates**, Solid mechanics and its applications, Vol.45, Dordrecht, Netherlands, Kluwer Academic Publishers, 1996, 230p., Refs. p.213-222.

**DLC TA714.5.M68 1996**

The effects of moving loads from vehicles and aircraft on floating sheets of sea or freshwater ice, are discussed. Most of the discussion is theoretical and mathematical, but field experiments and practical applications in both the Arctic and Antarctic are also included, with those in the Antarctic particularly concerned with aircraft landing and traveling on sea ice.

**F-56664**

Gore, D.B., ed, **Last glaciation of Vestfold Hills: extension of the East Antarctic ice sheet or lateral expansion of Sørsdal Glacier?**, *Polar record*, Jan. 1997, 33(184), p.5-12, Refs. p.11-12.

Opinions are divided as to whether the area of Vestfold Hills was formerly covered by the East Antarctic ice sheet or Sørsdal Glacier. Striae orientations have been used to erect the model of extension of the ice sheet followed by a minor lateral expansion of Sørsdal Glacier, while basal till fabrics; distribution of weathered rock; and the nature, orientation, and distribution of moraines have been used to conclude that lateral expansion of Sørsdal Glacier alone can explain the evidence of the last glaciation of Vestfold Hills. A review of all available data supports the model of regional glaciation by an extended East Antarctic ice sheet. Lateral expansion of Sørsdal Glacier has probably only played a minor role in the glaciation of Vestfold Hills since the regional glaciation. (Auth.)

**F-56681**

Muir, H., **Giant lake lurks beneath Antarctica's ice**, *New scientist*, June 22, 1996, 150(2035), p.16.

Hidden deep beneath the antarctic ice is a lake the size of Northern Ireland. The lake, which is cut off from the world above by a 4 km layer of ice, is likely to harbor unique life forms that have adapted to subzero temperatures and crushing pressures. Called Lake Vostok, the lake lies beneath Russia's Vostok ice-drilling station, and is one of 77 lakes known to lie under the antarctic ice sheet. It came to light during radio-echo experiments in the 1970s. But until now, no one knew the lake's size. Ellis-Evans hopes that it will eventually be possible to retrieve healthy microorganisms from the lake bed without contaminating their ancient environment. (Auth. mod.)



**F-56686**

Zoccolillo, L., Amendola, L., Tarallo, G.A., **Halocarbons in antarctic surface waters and snow**, *International journal of environmental analytical chemistry*, 1996, Vol.63, p.91-98, 10 refs.

Surface and pit snow samples, collected from Terra Nova Bay area during the Italian expeditions of 1991-92 and 1992-93, were analyzed for halocarbons: tetrachloromethane, trichloroethylene and tetrachloroethylene. The results obtained (including those related to lake and ice water samples previously reported) were evaluated with respect to the worldwide distribution of these compounds and their diffusion on a global scale. Important innovations, concerning sensitivity and reproducibility of the analytical method, are also reported. (Auth.)

**F-56690**

Bentley, C.R., **Rapid sea-level rise soon from west antarctic ice sheet collapse?**, *Science*, Feb. 21, 1997, 275(5303), p.1077-1078, 22 refs.

The author suggests and analyzes several conditions which could cause an imminent collapse of the ice sheet atop West Antarctica. In the end he shows that many of the necessary conditions are already in operation but that the system is not significantly out of mass balance. He concludes that the chances of a natural collapse of the west antarctic ice sheet, based on the concept of a randomly timed collapse on the average of once every 100,000 years, are on the order of 0.1%.

**F-56711**

International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996, **IGARSS'96. Remote sensing for a sustainable future**, New York, Institute of Electrical and Electronics Engineers, 1996, 2383p. (4 vols.), Refs. passim. For selected papers see 51-2418 through 51-2516 or A-56713, C-56714, C-56719, C-56722 through C-56725, F-56712, F-56715 through F-56720, F-56726 through F-56728 and I-56721.

**DLC QE33.2.R4I57 1996**

This is a collection of over 900 papers presented at the International Geoscience and Remote Sensing Symposium (IGARSS'96) held in Lincoln, NE, July 27-31, 1996. Most of the papers deal with global, low- or mid-latitude, or specifically northern high-latitude remote sensing, but 17 papers are pertinent to Antarctica, and deal mainly with satellite remote sensing of the antarctic ice sheet and sea ice. They include discussions on the possibility of using satellite scatterometers, originally designed to measure wind speed and direction over the ocean from sea surface backscattering data, to determine backscattering signatures from sea ice. Also included are papers on the Alaska SAR (synthetic aperture radar) Facility, which has installed a downlink at McMurdo Station for the Canadian RADARSAT to begin operation on the Antarctic Mapping Project in mid-1996.

**F-56712**

Noltimier, K.F., Jezek, K.C., **Variations in radar backscatter across the great ice sheets**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.1, New York, Institute of Electrical and Electronics Engineers, 1996, p.142-144, 6 refs.

**DLC QE33.2.R4I57 1996**

Radar backscatter over the great ice sheets is modulated by the near surface properties of polar firm. These properties (grain size, density, stratigraphy, wetness) change in time and from region to region. Information was compiled on the spatial variation in backscatter across selected parts of Antarctica and Greenland from ERS-1 SAR data. The SAR-derived  $\sigma^0$  compared favorably with both *in situ* and the ERS-1 scatterometer data obtained from literature. These results will be used to refine processing schemes for the Radarsat Antarctic Mapping Project. A plot of the azimuthal anisotropy of SAR-derived  $\sigma^0$  was created to determine the magnitude of azimuthal anisotropy on a pixel by pixel basis. Azimuthal variability for a region of the Antarctic Peninsula was found to vary from 0 to 14dB. (Auth.)

**F-56715**

Johannessen, O.M., Miles, M.W., Bjørge, E., **Global sea ice mon-**

**itoring from microwave satellites**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.2, New York, Institute of Electrical and Electronics Engineers, 1996, p.932-934, 12 refs.

**DLC QE33.2.R4I57 1996**

The global sea ice covers can be regularly and frequently monitored using satellite passive microwave sensors. Recent studies using passive microwave have detected significant decreases in arctic ice extent and ice area, with no significant changes in the Antarctic. (Auth. mod.)

**F-56716**

Yueh, S.H., Kwok, R., Lou, S.H., Tsai, W.Y., **Sea ice identification using dual-polarized Ku-band scatterometer data**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.2, New York, Institute of Electrical and Electronics Engineers, 1996, p.935-937, 6 refs.

**DLC QE33.2.R4I57 1996**

This paper describes a classification algorithm using dual-polarized scatterometer measurements to identify the edge of the sea ice cover in the Arctic and Antarctic. The distinct polarization scattering signatures of sea ice and open water are discussed and illustrated with the dual-polarized radar measurements from the Seasat-A scatterometer (SASS). The analysis of SASS data suggests that the ratio of vertical and horizontal polarization backscatter, denoted as the copol ratio, is a useful discriminator of sea ice and open ocean. A simple classification algorithm using the thresholds of the copol ratio and backscatter levels is proposed. The feasibility of this algorithm is demonstrated using the SASS data from the single-sided, dual-polarization mode. The results indicate that the dual-polarized measurements from the NASA scatterometer (NSCAT) can be used to produce routine maps of sea ice extents. (Auth. mod.)

**F-56717**

Winebrenner, D.P., **Polarimetric backscattering at 23 cm wavelength from antarctic lead ice and estimation of ice thickness**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.2, New York, Institute of Electrical and Electronics Engineers, 1996, p.941-943, 4 refs.

**DLC QE33.2.R4I57 1996**

New data from the Shuttle Imaging Radar-C (SIR-C) mission in Oct. 1994 showing leads in the northern Weddell Sea are presented and compared with images from the Beaufort Sea. As in the Beaufort Sea, essentially no surface observations are available, but conventional SAR imagery suggests the presence of lead ice of at least two distinct ages in close proximity in the Weddell scene. Ice regions in the two categories show spatially coherent, but quite different, polarimetric signatures at L-band, including copolar phases larger than neighboring thicker ice in one case and smaller in the other. It is suggested that though still uncertain for now, the possibility of estimating lead ice thickness directly from snapshot and time-sequential L-band polarimetric synthetic aperture radar imagery is promising for the future. (Auth. mod.)

**F-56718**

Williams, R.N., Hartnett, J., **Prototype sea ice mapping system using a geographical information system and expert knowledge**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.2, New York, Institute of Electrical and Electronics Engineers, 1996, p.1111-1113, 6 refs.

**DLC QE33.2.R4I57 1996**

An operational sea ice mapping system is being developed which will assist meteorologists at the Casey antarctic base to create sea ice maps, from NOAA AVHRR imagery received at the base itself. The system will take AVHRR imagery initially processed via the McIdas meteorological system, and initiate an interactive procedure which assists the expert interpreter to produce a sea ice map from the imagery. A prototype system, called ICEMAPPER, has been developed. It is based on an existing geographical information system and uses production rules, incorporating expert knowledge derived both from the scientific literature and from local



sea ice interpreters, to provide an initial classification. If the expert is satisfied with the map produced it can be printed out. If not, thresholds used in the production rules can be altered interactively and the map recreated. (Auth.)

#### F-56720

Alhumaidi, S.M., Jones, W.L., Park, J.D., Ferguson, S., Thursby, M.H., Yueh, S.H., **Neural network sea ice edge classifier for the NASA scatterometer**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.3, New York, Institute of Electrical and Electronics Engineers, 1996, p.1526-1528, 6 refs.

#### DLC QE33.2.R4I57 1996

The NASA Scatterometer (NSCAT) to be launched in Aug. 1996 is designed to measure wind vectors over ice-free oceans. To prevent contamination of the wind measurements by the presence of sea ice, an algorithm based on only NSCAT data is described. Results are presented for a neural network trained using dual linear polarized Ku-band backscatter measured by the SeaSat-A Satellite Scatterometer (SASS). These results demonstrate the utility of neural network classifiers to provide this ice flag. The algorithm compared well with SASS data from the Antarctic. (Auth. mod.)

#### F-56726

Davis, C.H., **Robust threshold retracking algorithm for extracting ice-sheet surface elevations from satellite radar altimeters**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.3, New York, Institute of Electrical and Electronics Engineers, 1996, p.1783-1787, 6 refs.

#### DLC QE33.2.R4I57 1996

A threshold retracking algorithm for processing ice-sheet altimeter data from Greenland and Antarctica is presented. The threshold algorithm and three other ice-sheet retracking algorithms were compared. The algorithm comparisons were made using Seasat and Geosat datasets comprised of over 30,000 crossover points. Results show that the threshold retracking algorithm produces ice-sheet surface elevations that are more repeatable than the elevations derived from all the other retracking algorithms. For analysis of long-term change in ice-sheet surface elevations, it is critical that a retracking algorithm produce repeatable elevations. The more consistent an algorithm is in selecting the retracking point the less likely that biases will be introduced by the retracking scheme in the elevation change measurement. For this reason, the robust threshold retracking algorithm has been adopted by NASA/GSFC as an alternative to their existing algorithm for production of ice-sheet altimeter datasets under the NASA Pathfinder program. The threshold algorithm will be used to re-process existing ice-sheet altimeter datasets and to process the datasets from future altimeter missions. (Auth. mod.)

#### F-56727

Thomas, C.H., Heygster, G.C., **Individual weather correction for antarctic sea-ice concentrations from SSM/I**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.3, New York, Institute of Electrical and Electronics Engineers, 1996, p.1788-1790, 13 refs.

#### DLC QE33.2.R4I57 1996

Antarctic sea-ice concentration as determined from the brightness temperatures of passive microwave sensors is affected frequently by high values of atmospheric water vapor, cloud liquid water, rain and sea surface roughening by surface winds. A correction scheme for SSM/I taking these influences into account is presented. Over open water, water vapor, liquid water and wind determined from the SSM/I signal serve to reduce the brightness temperatures to clear sky conditions using a radiative transfer model. When applied to a sample scene, the procedure results in reduced mean value for sea-ice extent, sea-ice area and open water, but increased ice concentration. (Auth.)

#### F-56728

Markus, T., **Effect of the grounded tabular icebergs in front of**

**Berkner Island on the Weddell Sea ice drift as seen from satellite passive microwave sensors**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.3, New York, Institute of Electrical and Electronics Engineers, 1996, p.1791-1793, 4 refs.

#### DLC QE33.2.R4I57 1996

The huge grounded tabular icebergs in the southern Weddell Sea might have a significant influence on the sea ice drift, because they form a barrier to the clockwise circulation. The influence of these icebergs on the sea ice distribution is studied with ice concentration analyses from satellite passive microwave sensors over an eleven year period. Besides total ice concentration the fractions of the two different types distinguished in the NASA Team algorithm are studied. One is attributed to first-year ice and the other to deformed ice or ice with heavy snow cover. Results show that the ice coverage east of the icebergs has changed from 40% to between 80 and 90% in summer. This happens because the southward drifting sea ice is trapped between the continent on the right and the icebergs on the left. Therefore less ice formation in this area results in less heat exchange and brine release, which might effect the oceanic processes in front and under the ice shelves. (Auth.)

#### F-56760

Gingele, F.X., Kuhn, G., Maus, B., Melles, M., Schöne, T., **Holocene ice retreat from the Lazarev Sea shelf, East Antarctica**, *Continental shelf research*, Feb. 1997, 17(2), p.137-163, Refs. p.161-163.

Distinct facies types, classified in radiocarbon-dated sediments from the shelf of the Lazarev Sea, East Antarctica, reveal a detailed history of processes that have controlled sedimentation during the deglaciation over the last 10,000 yr. The ice retreat on this part of the antarctic shelf started 9500 yr BP, marked by the deposition of laminated sediments, deposited from a floating ice shelf. These laminites, which occur on top of diamictites laid down from a grounded ice sheet, are the basal sediments of the postglacial sequence. The intensity of the Antarctic Coastal Current (ACC), directed by shelf morphology, controlled sedimentation of the postglacial facies. Current velocities apparently decreased between 8000 and 2000 yr BP due to a deflection of the ACC by advancing ice tongues to the east of the investigation area during the 'Hypsithermal'. This led to a deposition of fine-grained sediments, and clay mineralogy suggests a continental source, possibly near the grounding line of the Nivl Ice Shelf, rather than a winnowing of sediments near the shelf break or advection from deeper water. (Auth. mod.)

#### F-56775

Sukhorukov, K.K., **Experimental investigations of relaxation properties of sea ice internal stresses**, International Offshore and Polar Engineering Conference, 6th, Los Angeles, CA, May 26-31, 1996 Proceedings. Vol.2. Edited by J.S. Chung, M. Sayed, R.E. Hobbs, and D.R. Yoerger, Golden, CO, International Society of Offshore and Polar Engineers (ISOPE), 1996, p.354-361, 10 refs.

#### DLC TC1665.I5793a 6th V.2 1996

Studies on relaxation of internal stresses in sea ice and breakup of ice floes were conducted from the North Pole-30 drift station in the Chukchi Sea in spring 1990, and from the Weddell-1 drift station in the Weddell Sea in spring 1992. It was found that the relaxation time was 21 hours both in the Arctic when an ice crack was 150 m long and the ice was 3 m thick, and in the Antarctic when an ice crack was 75 m long and the ice was 1.5 m thick, that is, the relaxation time was the same for both when the crack was 50 times longer than the ice thickness. Observations in the Weddell Sea indicate that the relaxation time can be approximated by dividing the crack length by the ice thickness, taking the square root of that ratio, and multiplying by three.

#### F-56776

Thiel, K.H., Wu, X.Q., **Monitoring ice movement in Antarctica**, International Offshore and Polar Engineering Conference, 6th, Los Angeles, CA, May 26-31, 1996 Proceedings. Vol.2. Edited by J.S. Chung, M. Sayed, R.E. Hobbs, and D.R. Yoerger, Golden, CO, International Society of Offshore and Polar Engineers



(ISOPE), 1996, p.401-405, 6 refs.

**DLC TC1665.I5793a 6th V.2 1996**

Monitoring the changes of the ice cover and the movement of the ice in the remote antarctic region continuously is quite difficult. ERS SAR Interferometry provides a tool to perform this task. For the region around Hemmen Ice Rise (HIR) it is demonstrated, that topography, tidal variations and horizontal movements of shelf ices can be estimated. A number of SAR images obtained by ERS-1 satellite in three day time intervals are used in the experiment. The evaluated topography is in good agreement with the topographic map. The differential interferometry has been used to estimate the tidal changes between the data acquisitions. A horizontal movement map of the ice surface around the HIR on the Antarctic was obtained by using the displacements in azimuth and slant range involved in the interferogram together with the given tidal heights. The combination of two interferograms from ascending and descending orbits with different look angles allows for accurate determination of the motion of the shelf ice around HIR. Also the width change of the crevasses on the shelf ice for a three day interval can be determined. (Auth. mod.)

**F-56777**

Johannessen, O.M., Miles, M.W., Bjørge, E., **Global sea ice monitoring from microwave satellites**, International Offshore and Polar Engineering Conference, 6th, Los Angeles, CA, May 26-31, 1996 Proceedings. Vol.2. Edited by J.S. Chung, M. Sayed, R.E. Hobbs, and D.R. Yoerger, Golden, CO, International Society of Offshore and Polar Engineers (ISOPE), 1996, p.422-426, 14 refs.

**DLC TC1665.I5793a 6th V.2 1996**

The most direct sources of consistent, repetitive information on the polar sea ice covers are satellite passive microwave sensors. Previous studies using microwave data have detected decreases in arctic ice extent and ice area, but no significant changes in the Antarctic. The authors analyzed microwave data 1978-1995, to identify changes in ice extent, ice area, and overall ice concentration. They found continued decreases in the arctic ice extent and ice area, as well as a decrease in the overall ice concentration. Also included is a seasonal analysis of the arctic ice cover, which reveals the greatest decreases to be in summer. The relatively large summer decreases imply a reduction in the multi-year ice area, suggesting reduced ice thickness. These findings have considerable implications for global warming and are important for polar operations. (Auth. mod.)

**F-56793**

Loeb, N.G., **In-flight calibration of NOAA AVHRR visible and near-IR bands over Greenland and Antarctica**, *International journal of remote sensing*, Feb. 1997, 18(3), p.477-490, 10 refs.

A new method for in-flight calibration of NOAA AVHRR visible and near-IR bands is presented. The approach involves using calibrated NOAA-9 near-nadir reflectances over spatially and temporally uniform ice-surfaces from Greenland and Antarctica to produce reflectance calibration curves for AVHRR instruments in all orbits. The reflectance calibration curves consist of second order polynomial regressions of reflectance on solar zenith angle, derived from observations that are spatially uniform in all AVHRR channels over sub-regions of area 68 km by 68 km. By comparing reflectances from uncalibrated AVHRR instruments with these calibration curves, new channel 1 and 2 calibration coefficients are obtained with an accuracy of  $\approx 5\%$ . The main advantages of this calibration method are: calibration targets are large; it can be applied over multiple years; and it is applicable for a wide range of solar zenith angles, and can therefore be used year-round. (Auth. mod.)

**F-56812**

Cini, R., et al, **Can the marine organic matter evidenced in antarctic snow be responsible of biogeochemical fractionation in marine aerosol?**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.211-227, 30 refs.

Previous findings of marine organic surfactant matter in antarctic snow, lead the authors to consider a biogeochemical fractionation of marine aerosol. They propose a new simplified model based on the distribution of marine surfactant adsorption layer on the surface of spray drops (SDALM) which are originated during the breaking wave events. Field conditions and laboratory experiments seem to explain, according to SDALM, the anomalous enrichment of K and Ca in marine aerosol found

in antarctic snow at altitudes higher than 700 m above sea level. The application of SDALM could suggest a new general approach to the variations in the composition of the marine aerosol fine fraction. (Auth.)

**F-56813**

Piccardi, G., Becagli, S., Traversi, R., Udisti, R., **Fractionating phenomena, altitude induced, on snow composition in northern Victoria Land (Antarctica)**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.229-245, 17 refs.

Chemical analysis of snow and firn samples, collected from snow pits and coring at different altitudes, has revealed fractionating phenomena of the atmospheric aerosol and has identified principal and secondary sources of some environmental components. Using sodium as sea spray source indicator and methanesulphonic acid as biogenic marine tracer, it has been possible to evaluate the altitude contribution and the size of aerosol particles on the snow composition and on the progressive importance of fractionating phenomena. As the elevation of the station increases (and the particle size decreases) evidence of secondary sources of K, Ca and non-sea-salt sulphates has been noted. The dating of the snow layers sampled has shown the seasonal character of the principal and secondary sources of some of the components studied. (Auth.)

**F-56814**

Del Guasta, M., et al, **Observation of liquid particles at -65° in a polar cirrus**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.247-252, 10 refs.

Theoretical and laboratory studies confirm that pure water cannot exist as a liquid below about -40°. Liquid droplets have seldom been observed in cirrus clouds at about -50°C. The LIDAR technique can help find unusual supercooled clouds when the depolarization technique is implemented: the presence of non-depolarizing layers in a cloud is indicative of a very special scattering media; scattering particles must have a symmetry axis oriented along the laser beam. This is possible either with spherical droplets or ice plates horizontally oriented. In this work, a -65°C non-depolarizing cloud observed in a polar region is studied, indicating that supercooled droplets are responsible for the absence of depolarization in most of the cloud. This is the coldest supercooled cirrus ever observed. (Auth. mod.)

**F-56833**

Watanabe, O., ed, NIPR Symposium on Polar Meteorology and Glaciology, 18th, Tokyo, July 18-19, 1995, **Proceedings of the NIPR Symposium on Polar Meteorology and Glaciology, No.10**, Tokyo, National Institute of Polar Research, 1996, 174p., Refs. passim. For selected papers see C-56846, F-56834 through F-56837, F-56839, F-56840, F-56845, F-56847, I-56838, I-56841 through I-56844 or 51-2669 through 51-2679.

This is a collection of papers presented at the 18th Symposium on Polar Meteorology and Glaciology held in Tokyo on July 18-19, 1995. It consists of 14 full-length papers and 21 abstracts; the former were refereed and are arranged in the order of scientific areas of glaciology, meteorology and physical oceanography.

**F-56834**

Shiraiwa, T., Shoji, H., Saito, T., Yokoyama, K., Watanabe, O., **Structure and dielectric properties of surface snow along the traverse route from coast to Dome Fuji Station, Queen Maud Land, Antarctica**, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.10, Tokyo, National Institute of Polar Research, 1996, p.1-12, 20 refs.

Stratigraphic observations were carried out on the surface snow from the coast to the ice divide at Dome Fuji in the summer of 1994-95, to provide microwave remote sensing with ground truth data. Stratification, grain size and dielectric properties were measured in 1 m-deep snow pits. The dry snow zone of the studied area is divided into three parts: a region of compacted snow and solid-type depth hoar (1000 to 2000/2300 m a.s.l.), where spatial and vertical distribution of various snow properties are uniform; a region of wind-packed snow and skeleton-type depth hoar (2000/2300 to 3500 m), which is characterized by spatial alteration of the glazed



surface and the stratified depth hoar layer; and a region of interbedded skeleton- and solid-types depth hoar (higher than 3500 m) where the seasonal stratification of snow is characterized by thin-hard summer and thick-soft winter layers. (Auth. mod.)

#### F-56835

Furukawa, T., Kamiyama, K., Maeno, H., **Snow surface features along the traverse route from the coast to Dome Fuji Station, Queen Maud Land, Antarctica**, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.10, Tokyo, National Institute of Polar Research, 1996, p.13-24, 15 refs.

Frequencies of snow surface features such as sastrugi, dunes and thermal cracks were measured along the traverse route from the coastal region to Dome Fuji. The route is divided into 3 regions: the coastal region, characterized by high frequency of small sastrugi and low frequency of dunes; the katabatic wind region, characterized by the co-existence of small and large sastrugi, dunes and glazed surface; and the inland region, characterized by low frequencies of small sastrugi and dunes. These regional characteristics of snow surface features reflect the deposition-erosion process affected by surface topography of the ice sheet. A glazed surface zone, where snow accumulation is small, develops on steep slopes above the large convex bedrock topography. This indicates that bedrock topography is one of the factors controlling snow accumulation patterns in the katabatic wind region on the antarctic ice sheet. (Auth.)

#### F-56836

Matsuoka, K., Fujita, S., Matsuoka, T., Ishida, T., Hondoh, T., Mae, S., **Measurements of the complex permittivity of acid-doped ice from 1 kHz to 30 MHz: new data set for developing ice radar and dielectric analysis of ice cores**, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.10, Tokyo, National Institute of Polar Research, 1996, p.25-35, 16 refs.

The authors measured the complex permittivity of pure and acid (HCl, HNO<sub>3</sub> and H<sub>2</sub>SO<sub>4</sub>)-doped ice from 1 kHz to 30 MHz and from -9°C to -33°C. The complex permittivity of acid-doped ice is assumed to depend linearly on the concentration. The frequency and temperature dependence of the relationship between the complex permittivity and the acid concentration are investigated. The tendency of dielectric dispersion of acid-doped ice is discussed. A simple calculation shows that the reflection coefficient due to acidity change in the HF band in ice sheets increases with decreasing frequency. The effect of permittivity changes and loss tangent changes due to acidity changes to reflection coefficient are quantitatively shown, respectively. As a result, a data set which is essential to develop HF ice radar, and to compare radar echoes and ice core signals is established. (Auth.)

#### F-56837

Kohno, M., Fukuoka, T., Fujii, Y., Kusakabe, M., **Volcanic records and dating of the upper half of the H15 ice core from Mizuho Plateau, East Antarctica**, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.10, Tokyo, National Institute of Polar Research, 1996, p.36-54, Refs. p.52-54.

Two closely-spaced peaks of electrical conductivity were found at depths between 45 and 50 m of the 120-m long ice core drilled at site H15 in Antarctica by JARE-32 in 1991. Chemical analysis of the core revealed that the ice layers were characterized by high acidity and high sulfate concentration suggesting volcanic signals. In order to identify these characteristics, the core was dated using two methods: counting the number of high electrical conductivity peaks resulting from seasonal variations of SO<sub>4</sub><sup>2-</sup> and NO<sub>3</sub><sup>-</sup>, and an empirical model of firn densification. The dating results suggest that the high conductivity is related to deposition of acidic aerosols from the volcanic eruptions of Tambora in 1815 and of an unknown volcano in 1809. (Auth.)

#### F-56839

Gonda, T., Matsuura, Y., Wada, M., **Formation mechanism of plate-like ice crystals growing in air at low temperature and low supersaturation**, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.10, Tokyo, National Institute of Polar Research, 1996, p.66-72, 12 refs.

The supersaturation dependences on the slope of growth hillocks formed on the face P<sub>p</sub> and the face P<sub>B</sub> of ice crystals grown in air at -28.5°C and low supersaturation were measured to study the formation mechanism of plate-like ice crystals growing under this condition. It was found that both faces of plate-like ice crystals grown at -28.5°C and low supersaturation grew by the Burton-Cabrera-Frank (BCF) mechanism, and when the relationship P<sub>p</sub>>P<sub>B</sub> held, plate-like ice crystals grew. (Auth.)

#### F-56840

Satoh, K., Uchida, T., Hondoh, T., Mae, S., **Diffusion coefficient and solubility measurements of noble gases in ice crystals**, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.10, Tokyo, National Institute of Polar Research, 1996, p.73-81, 8 refs.

Diffusion coefficients and solubility of helium, neon and argon gases in ice crystals were determined by measuring the pressure rise in a vessel caused by gas emission from an ice sample supersaturated with the gas. Diffusion coefficients of helium, neon and argon gases in the temperature range between 258.2 K and 268.2 K were on the order of 10<sup>-9</sup> m<sup>2</sup>/s, 10<sup>-10</sup> m<sup>2</sup>/s and 10<sup>-11</sup> m<sup>2</sup>/s, respectively. Solubilities of helium and neon gases in the molar fraction deduced from the total amount of emitted gases were on the order of 10<sup>-6</sup> and 10<sup>-7</sup>, respectively. As the diffusion coefficients of noble gases were found to depend on their molecular radii, the diffusion coefficients of air molecules, such as nitrogen and oxygen, in ice were estimated. (Auth.)

#### F-56845

Enomoto, H., Warashina, H., Saito, T., Shiraiwa, T., **Interannual variability of sea ice conditions in Syowa Station sector deduced from DMSP SSM/I data**, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.10, Tokyo, National Institute of Polar Research, 1996, p.119-126, 15 refs.

This paper focuses on the interannual variability of sea-ice conditions in spring and summer in the vicinity of Showa Station. Sea ice extent and concentration are discussed using DMSP SSM/I satellite passive microwave data. Persistent high ice concentration was observed in Dec. in 1989 and 1993; the sea ice was formed earlier (Apr.-May) and expanded rapidly in this initial stage. The sea ice concentrations were higher throughout the winter season during these years. Cold and calm weather conditions in autumn seem to be important in determining the following winter ice conditions. (Auth.)

#### F-56847

Sato, K., Daimon, T., Takenaka, N., Bandow, H., Maeda, Y., **Decrease of solute in the aqueous solution in the freezing process**, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.10, Tokyo, National Institute of Polar Research, 1996, p.138-148, 13 refs.

Dilute volatile acidic aqueous solution was frozen by various freezing methods, and concentrations of solutes and pH of the sample were measured after the sample was completely thawed. Concentration of the volatile acid anion in the sample decreased, and pH of the sample increased after freezing. The decrease of solutes in the sample was almost equal to that detected in the gas phase. When dilute salt solution was frozen, solutes were excluded from ice and concentrated into the unfrozen solution. Concentrated anion combines with concentrated proton to form volatile acid such as acetic, formic or nitrous acid without reaction with any other chemicals. These volatile acids are saturated, and evaporation to the gas phase occurs. It is considered that the decrease in concentration of various solutes is mainly due to the freeze-concentration effect. (Auth.)

#### F-56857

Caulkett, A.P., Ellis-Evans, J.C., **Chemistry of streams of Signy Island, maritime Antarctic: sources of major ions**, *Antarctic science*, Mar. 1997, 9(1), p.3-11, 32 refs.

A general study of the streams of Signy I. was undertaken to identify the effects of catchment, distance from source, and time on concentrations of dissolved ions. In the majority of cases catchment did not affect the chemistry of streams, although marine-derived ions were affected by distance from the sea. Na<sup>+</sup>, K<sup>+</sup>, Mg<sup>2+</sup>, Ca<sup>2+</sup>, Cl<sup>-</sup> and NH<sub>4</sub><sup>+</sup> were derived from the thawing of the winter snowpack. NO<sub>3</sub><sup>-</sup> was derived from areas of per-



manent ice.  $\text{SiO}_4^{4-}$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$  and  $\text{CO}_3^{2-}$  were derived from crustal weathering. Although  $\text{PO}_4^{3-}$  was also derived from crustal weathering, it was released as a pulse related to the thawing of the soil. (Auth.)

#### F-56864

Frezzotti, M., **Ice front fluctuation, iceberg calving flux and mass balance of Victoria Land glaciers**, *Antarctic science*, Mar. 1997, 9(1), p.61-73, Refs. p.72-73.

The coast of Victoria Land extends from Williamson Head to McMurdo Sound. A comparison of various documents and images spanning several decades has allowed the determination of the ice front fluctuation and the iceberg calving flux during this century. From 1956-65 to 1972-73, the floating glaciers underwent a reduction of 978 km<sup>2</sup>, with an iceberg calving flux of about 134 km<sup>2</sup>/yr. From 1972-73 to 1989-91, the floating glaciers underwent an advance of 272 km<sup>2</sup>, with an iceberg calving flux of about 53 km<sup>2</sup>/yr. Glacier tongues with bottom accretion calve less often than those with bottom melting. Most floating glaciers have shown cyclic behavior without a strong trend. Exceptions are the Hells Gate ice shelf, the McMurdo Ice Shelf, and the floating glaciers of Cape Adare which have undergone a significant retreat since the beginning of the 20th century. The different behavior of these floating glaciers is attributed to increased energy available for meltwater production of marine ice, which progressively warmed the thin ice shelves and then increased iceberg calving, or to increased melting at the ice-ocean interface related to a major intrusion of Circumpolar Deep Water from the nearby continental slope. (Auth. mod.)

#### F-56882

Weertman, B.R., **Interpretation of ice sheet stratigraphy: a radio-echo sounding study of the Dyer Plateau, Antarctica**, Seattle, University of Washington, 1993, 197p., University Microfilms order No. 94-17099, Ph.D. thesis. Refs. p.131-137.

The author has used a newly devised RES system to measure the geometry of internal stratigraphy and ice thickness on the Dyer Plateau ice sheet. RES-determined stratigraphy was dated by comparison to ice core stratigraphy. A prominent shallow RES horizon probably associated with the eruption of Tambora (1815) was used for estimating the spatial accumulation rate pattern. The estimated pattern is consistent with the pattern measured from burial markers indicating that the new method is accurate and that the recent accumulation rate pattern is not different from the 175 year average. An analysis of ice core stratigraphy indicates that over the past 500 years the accumulation rate has varied and over the past 50 years has had an increasing trend. However, dated RES stratigraphy (top half of ice column) appears to be consistent with steady-state flow suggesting that climate variations over the past 500 years have not been sufficient to alter ice flow. (Auth. mod.)

#### F-56886

Worby, A.P., Jeffries, M.O., Weeks, W.F., Morris, K., Jaña, R., **Thickness distribution of sea ice and snow cover during late winter in the Bellingshausen and Amundsen Seas, Antarctica**, *Journal of geophysical research*, Dec. 15, 1996, 101(C12), p.28,441-28,455, 35 refs.

The data are a combination of *in situ* and ship-based measurements and show that the process of floe thickening is highly dependent on ice deformation; in particular, rafting and ridging play important roles at different stages of floe development. Rafting is the major mechanism in the early stages of development, and core structure data show the mean thickness of individual layers of crystals to be only 0.12 m. Most ice <0.3 m is not ridged but is usually rafted before attaining this thickness, well before thermodynamic growth has ceased. In thicker floes, ridging is more common, with most floes >0.6 m having some surface deformation. Blocks within ridge sails are typically in the range 0.3-0.6 m thick, and ship-based observations estimate approximately 25% of the pack exhibits surface ridging. When corrected for biases in the observational methods, the data show that the dominant ice and snow thickness categories are >0.7 m and 0.2-0.5 m, respectively, and account for 40% and 36% of the surface area of the pack ice. Approximately 8% of the pack is open water. An estimate of the effects of ridging on the distribution of ice mass within the pack suggests that between 50 and 75% of the total mass is contained within the 25% of the pack that exhibits surface ridging. (Auth. mod.)

#### F-56896

Anandakrishnan, S., Alley, R.B., **Stagnation of ice stream C, West Antarctica by water piracy**, *Geophysical research letters*, Feb. 1, 1997, 24(3), p.265-268, 23 refs.

The dynamic behavior of the West Antarctic ice sheet is of interest because of the possibility that it may change and cause rapid sea-level rise. Attention is focused on the fast-moving and rapidly responding ice streams that drain the ice sheet. One of these, ice stream C, largely stopped about a century ago, and some models for this shutdown postulate negative feedbacks that would tend to stabilize the ice-sheet. Here, new data are presented indicating that the slowdown of the ice stream is restricted to its lower part, and occurred because of loss of lubrication on localized "sticky spots" at the bed of the ice stream. The increased friction probably arises from a topographic accident of the glacier bed that has directed lubricating water to the neighboring ice stream B, together with slow drawdown of the ice sheet, rather than from any general stabilizing feedbacks. (Auth.)

#### F-56908

Wolff, E.W., Shabtaie, S., Bentley, C.R., **Comment on "Electrical resistivity sounding of the East Antarctic ice sheet" by Sion Shabtaie and Charles R. Bentley and Reply**, *Journal of geophysical research*, Dec. 10, 1996, 101(B12), p.27,735-27,740, 8 refs.

The disputing author disagrees with conclusions drawn in the original paper (see F-52509 / 49-3914) that ice resistivities are controlled by ice crystal size variations rather than by ice impurities content. He then cites reasons for the disagreement, concluding that once corrections are made for temperature and density, impurity content controls the conductivity of polar ice at both low and high frequencies. Authors of the original paper refute the analysis of the disputing author, citing the incapability of electrical conductivity to produce reliable data since it measures electrical current rather than conductivity, and that this condition has been known for more than 80 years.

#### F-56910

Jeffries, M.O., et al, **Late winter snow and ice characteristics of first-year floes in the Bellingshausen and Amundsen Seas, Antarctica: results of investigations during R.V. Nathaniel B. Palmer Cruise NBP 93-5 in August and September 1993**, Alaska. University. *Geophysical Institute. Report*, [1997], UAG-R-325, 51p. + append., 60 refs.

In Aug. and Sep. 1993, the R.V. *Nathaniel B. Palmer* operated for 37 days in the pack ice of the Bellingshausen and Amundsen seas supporting a sea ice research program, which included snow cover characterization, snow and ice thickness measurements and ice core analysis. The objective of the study was to improve the knowledge of the conditions and processes that contribute to first-year sea ice development and ice thickness variability in this region, and their impact on active microwave backscatter from the ice. The majority of snow depth values (76%) ranged from 0.05-0.35 m. The mean snow depth value was 0.23 m. The majority of ice thickness values (62%) ranged from 0.3-0.8 m. The mean ice thickness was 0.90 m. The snow ice layers had a mean thickness of 0.2 m and indicated that, by the end of winter, the thermodynamic development of the ice cover was dominated by seawater flooding of the snow/ice interface and snow ice formation. Snow ice layers were composed of 7-13% snow, which contributed to 2-4% of the total ice mass. (Auth. mod.)

#### F-56946

Smith, A.M., **Basal conditions on Rutford Ice Stream, West Antarctica, from seismic observations**, *Journal of geophysical research*, Jan. 10, 1997, 102(B1), p.543-552, 52 refs.

A seismic reflection profile, perpendicular to the ice flow direction has been acquired on Rutford Ice Stream. An interpretation of both the amplitude and phase of the seismic reflections from the ice-bed interface has been made to investigate the properties of the sub-ice material. Multiple reflections from the ice-bed interface on a number of seismic wide-angle lines allowed a calibration of the reflection coefficient at the bed. This enabled the acoustic impedance of the bed material to be calculated from the seismic reflection data. Almost three quarters of the ice stream bed at this site appears to be saturated, deforming sediments. The rest of the bed is probably also saturated sediments, but they are not deforming to any significant degree. Ice flow could include a combination of subglacial defor-



mation and basal sliding. Localized regions which support disproportionately high amounts of basal shear stress may also occur. From the seismic data, it is not possible to apportion relative amounts of restraint to these different processes. There does not appear to be any correlation between the different sections identified on the ice stream bed with either satellite images or nearby surface velocity data. (Auth. mod.)

#### F-56964

Sun, J.B., Liu, J.L., Guo, X.G., **Ice-geomorphologic information extract from satellite image on antarctic area around Larsemann Hills**, *Antarctic Research (Chinese edition)*, Dec. 1996, 8(4), p.20-30, In Chinese with English summary. 7 refs.

This paper discusses extracts of elevation and ice-geomorphologic information from the spectral and spatial features in the Landsat-TM image of Antarctica, with ARIES digital image processing system, raster-vector data transformation and creation of topologic relation between objects. Edited by RAMS processing system, the ice-geomorphologic map is plotted. At last, forming, distribution, change of ice-geomorphology and influence of the change on the environment are analyzed. (Auth.)

#### F-56966

Yang, Y.H., Wang, W.D., **Survey of ice avalanche in the area of Zhongshan Station, Antarctica**, *Antarctic Research (Chinese edition)*, Dec. 1996, 8(4), p.72-75, In Chinese with English summary.

Using digital-trigger seismography, measurements were carried out at Zhongshan Station to determine the relationship between glacier calving regularity and weather factors, such as temperature and wind speed. It is suggested that the data obtained could also be used in iceberg and ice sheet research. Results show that the calving frequency change curve has a parabolic shape from Jan. to Sep. From Oct. to Dec., the frequency increases rapidly; as the temperature rises, the calving frequency also increases. It is also found that frequency and wind speed are inversely related.

#### F-56978

Massom, R.A., Drinkwater, M.R., Haas, C., **Winter snow cover on sea ice in the Weddell Sea**, *Journal of geophysical research*, Jan. 15, 1997, 102(C1), p.1101-1117, 71 refs.

Measurements of snow thickness, temperature, salinity, density, and stratigraphy acquired during the 1992 Winter Weddell Gyre Study are presented. Results indicate that the winter snow cover on sea ice in the Weddell Sea is extremely variable. Extreme fluctuations in antarctic synoptic conditions occur during the austral winter. They result in unique modifications and additions to the snow layer during the aging process and act to stabilize an otherwise easily wind-redistributed shallow snow cover and develop well-packed drift features. The latter occur even over relatively undeformed areas of sea ice and have a significant localized effect on the snow thickness distribution. Significant variability in snow grain size and density is observed as a result of cyclical switches between high- and low-temperature gradient metamorphism. Multiple icy layers indicate multiple thaw-freeze events. One such event occurred during a 3-day station, during which the air temperature rose by 22°C in 12 hours. Also examined are mechanisms for flooding of the snow-ice interface, including snow loading. Even where the latter is not a factor, the layer of snow immediately above the snow-ice interface is commonly damp and saline (>10 per mill). Limitations in the data set are discussed, and comparisons are drawn with other experiments. (Auth. mod.)

#### F-56979

Haines, E.M., Buckley, R.G., Trodahl, H.J., **Determination of the depth dependent scattering coefficient in sea ice**, *Journal of geophysical research*, Jan. 15, 1997, 102(C1), p.1141-1151, 23 refs.

Measurements of the spatial spreading of light in typical first-year sea ice in McMurdo Sound have been characterized in terms of depth dependent scattering using Monte Carlo simulations. The results are shown to place constraints on models of the optical transmission of sea ice and on the relationship of the optical scattering parameters to the physical structure of the ice. Comparisons for different sites and seasons within a given year and between years are presented. The backscattering spatial profiles are shown to fix the scattering parameters of the strongly scattering top layer and the horizontal component of the anisotropic scattering parameter

in the bulk layer. The transmission spatial profiles determine the anisotropy of the bulk layer and the absorption by algae near the base of the ice. It is demonstrated that the top layer is very sensitive to warming of the ice and that the scattering properties of this layer largely determine the albedo of sea ice while the transmission is affected by the nature of the top layer, the scattering in the bulk layer, and the absorption in the algal layer. A quantitative relationship between the scattering length and the air volume fraction is demonstrated. (Auth.)

#### F-56993

Morris, E.M., Mulvaney, R., **Recent changes in surface elevation of the Antarctic Peninsula ice sheet**, *Zeitschrift für Gletscherkunde und Glazialgeologie*, 1995, Vol.31, International Commission on Snow and Ice. Symposium on Measurement and Reconstruction of Glacier Mass Balance, Pt.1. Edited by M. Kuhn, p.7-15, With German summary. 8 refs.

Eight over-snow level lines were set up over the period 1972-1986 in Palmer Land and on Alexander I. The height of the snow surface with respect to fixed points on local nunataks was measured using traditional surveying techniques. Further data were collected during the 1992-93 austral summer when satellite surveying techniques were used to remeasure the level lines. Accumulation changes at three of the sites have been determined from ice cores. At two cold sites with mean annual temperatures of -15.2°C and -19.5°C the ice sheet is thickening in response to the increased accumulation associated with warmer temperatures. At two warmer valley glacier sites with mean annual temperatures greater than -11°C and where ablation occurs in the summer, the ice volume is shrinking in response to warmer climate. (Auth. mod.)

#### F-56995

Giovinetto, M.B., Zwally, H.J., **Assessment of the mass budgets of Antarctica and Greenland using accumulation derived from remotely sensed data in areas of dry snow**, *Zeitschrift für Gletscherkunde und Glazialgeologie*, 1995, Vol.31, International Commission on Snow and Ice. Symposium on Measurement and Reconstruction of Glacier Mass Balance, Pt.1. Edited by M. Kuhn, p.25-37, With German summary. 38 refs.

Net accumulation at the surface or surface balance values derived elsewhere for areas of dry snow in Antarctica and Greenland are used to produce revised estimates of accumulation in the areas delimited by the equilibrium line. The values were derived for grid-point locations 100 km apart using remotely sensed brightness temperature and surface temperature. The grid-point approach is used to revise accumulation estimates based on either contouring or parameterization of field data for each ice sheet. Integrated for the area delimited by the equilibrium line, and relative to various estimates in recent literature, the revised estimates of accumulation suggest e.g. an increase of 7% for Antarctica including the ice shelves, and decreases of 3% for the grounded ice in Antarctica and of at least 12% for Greenland. These overall revised estimates are used to assess the changes they would introduce in either recent mass budget estimates for Antarctica including the ice shelves, or in mass budget estimates that could be produced from recent estimates of mass input and output for the grounded ice in Antarctica and for Greenland. Suggestions are made on probable improvements for estimates of accumulation and the possible use of new technology to determine the mass budget of the ice sheets. (Auth. mod.)

#### F-56996

Giovinetto, M.B., Zwally, H.J., **Annual changes in sea ice extent and of accumulation on ice sheets: implications for sea level variability**, *Zeitschrift für Gletscherkunde und Glazialgeologie*, 1995, Vol.31, International Commission on Snow and Ice. Symposium on Measurement and Reconstruction of Glacier Mass Balance, Pt.1. Edited by M. Kuhn, p.39-49, With German summary. 33 refs.

Multivariate analyses of mean annual net accumulation at the surface on the conterminous grounded ice sheets of East Antarctica, West Antarctica and Greenland are performed using grid-point values 100 km apart. The independent variables are latitude, surface elevation, mean annual surface temperature as an index of tropospheric temperature, and mean annual distance to open ocean as a source of moisture. The results suggest



that changes in sea ice extent of the magnitude observed in recent decades could indirectly contribute up to  $\pm 0.2$  mm/y to the observed annual changes of sea level. (Auth. mod.)

#### F-57050

Kawamura, T., Ohshima, K.I., Takizawa, T., Ushio, S., **Physical, structural, and isotopic characteristics and growth processes of fast sea ice in Lützow-Holm Bay, Antarctica**, *Journal of geophysical research*, Feb. 15, 1997, 102(C2), p.3345-3355, 41 refs.

A sea-ice/ocean study was conducted off Queen Maud Land and Enderby Land from 1990 to 1991 by the Japanese Antarctic Research Expedition. Observations of multiyear land fast sea ice were made in Lützow-Holm Bay over a period of 2 years to determine the snow and ice characteristics and ice growth processes. The snow depth in the bay reached large values of 1.0 to 1.5 m during the winter season at offshore locations. From the analysis of ice thickness measurements, it is confirmed that the fast ice with deep snow cover grew little in winter but substantially thickened during the summer months. It is concluded that the summer growth was caused by upward growth at the top of the ice to which snow ice and superimposed ice formation contribute. These processes were the primary contributors to sea-ice growth and characteristics only where the snow accumulation was large. In areas of low snow accumulation, there was no surface growth. Superimposed ice formation on sea ice in Antarctica has not been reported previously. (Auth. mod.)

#### F-57052

Jacobs, S.S., Jenkins, A., Hellmer, H.H., **On the mass balance of West Antarctica's Pine Island Glacier**, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Oct. 1996, SR 96-27, p.52-56, ADA-321 342, 21 refs.

Perceptions of the total mass of the antarctic ice sheet have changed much faster over recent decades than any conceivable climate-related changes, as Mark Meier has illustrated. A search for evidence that might fit the Meier steady-growth principle led the authors to review the mass balance problem for Pine Island Glacier, (PIG), a key element of the West Antarctic Ice Sheet. The PIG example illustrates that basal melting may be underestimated. Moreover, the history of estimates of the net mass balance at the base of antarctic ice shelves shows a trend analogous to that of the total mass of the ice sheet. It appears that the ocean currently melts away a mass equivalent to approximately one-third of the recently increased annual accumulation on the antarctic ice sheet. (Auth. mod.)

#### F-57080

Harder, M., **Expanding a numerical dynamic-thermodynamic sea ice model toward the understanding of ice deformation** [Erweiterung eines numerischen dynamisch-thermodynamischen Meereismodells zur Erfassung deformierten Eises], *Alfred-Wegener-Institut für Polar- und Meeresforschung. Report in the physical sciences*, Feb. 1994, No.50, 145p., In German. 42 refs.

In eight sections overall descriptions are given of the model, how it operates, what problems were encountered, and what resolutions were woven into the plan. The sea ice model is regarded as part of climate research and its thermodynamic import receives full emphasis in such aspects as sea ice flowing, melting, ridging, rafting, and energy balance. The model was broadened to include flow trajectory, mathematical schemes and stimulus functions are described, and adjustments to the model parameters were incorporated. Simulated results were examined, compared with observations, and further adjustments were made. In Section 8, eight separate variations and sensitivity studies are presented and discussed. In the final section the entire project is summarized and prospects of its success are offered.

#### F-57085

Basile, I., Grouset, F.E., Revel, M., Petit, J.R., Biscaye, P.E., Barkov, N.I., **Patagonian origin of glacial dust deposits in East Antarctica (Vostok and Dome C) during glacial stages 2,4 and 6**, *Earth and planetary science letters*, Feb. 1997, 146(3-4), p.573-589, 51 refs.

The source area of continental dust deposited at both Vostok and Dome C sites (East Antarctica) during the glacial stages of the last two climatic cycles has remained constant. The isotopic composition of the ice-

core dust has been compared with the isotopic composition of the potential source areas: Antarctica: New Zealand, Southern Africa, Australia and South America. This comparison reveals the southern South American provenance of the dust for all three glacial periods. The Patagonian loess and the marine shelf sediments from the Argentine continental shelf, which was variably emerged during glacial periods, display different isotopic compositions and that the composition of the Patagonian loess best matches the signature of the ice-core dust. The identification of the Patagonian region as the source of the windblown dust deposited over East Antarctica during all the latest glacial periods permits a better understanding of paleo-atmospheric circulations of the last climatic cycles and a better constraint on the parameterization of dust sources for paleoatmospheric general circulation models. (Auth. mod.)

#### F-57097

Ohmura, A., Wild, M., Bengtsson, L., **Possible change in mass balance of Greenland and antarctic ice sheets in the coming century**, *Journal of climate*, Sep. 1996, 9(9), p.2124-2135, 24 refs.

A high-resolution General Circulation Model (GCM) is found to simulate precipitation and surface energy balance of high latitudes with high accuracy. This opens new possibilities to investigate the future mass balance of polar glaciers and its effect on sea level. The surface mass balance of the Greenland and the antarctic ice sheets is simulated using the ECHAM3 GCM. With this model, two 5-year integrations for the present and doubled carbon dioxide conditions based on the boundary conditions provided by the ECHAM1/T21 transient experiment have been conducted. A comparison of the two experiments over Greenland and Antarctica shows to what extent the effect of climate change on the mass balance on the two largest glaciers of the world can differ. On Antarctica a large increase in accumulation without melt is projected. Translating the mass balances into terms of sea-level equivalent, the mass balance accumulation on Antarctica tends to lower it by 0.9 mm/yr. The change in the combined mass balance of the two continents is almost zero. (Auth. mod.)

#### F-57100

Björge, E., Johannessen, O.M., Miles, M.W., **Analysis of merged SMMR-SSM/I time series of arctic and antarctic sea ice parameters 1978-1995**, *Geophysical research letters*, Feb. 15, 1997, 24(4), p.413-416, 17 refs.

Satellite passive microwave sensors, the Nimbus 7 Scanning Multichannel Microwave Radiometer and the Defense Meteorological Satellite Program Special Sensor Microwave Imager flew simultaneously during a 6-week overlap period in July and Aug. 1987, thus enabling intercomparison of the two sensors. Brightness temperatures are corrected for instrument drift and calibration differences in order to produce continuous time series of monthly averaged arctic and antarctic sea ice extent and sea ice area through the use of the NORwegian Remote Sensing EXperiment algorithm, which relates brightness temperatures to ice concentration. The results are consistent with simulations that suggest retreat of the sea ice cover under global warming scenarios. (Auth. mod.)

#### F-57122

Scarponi, G., Barbante, C., Turetta, C., Gambaro, A., Descon, P., **Chemical contamination of antarctic snow: the case of lead**, *Microchemical journal*, Jan. 1997, 55(1), p.24-32, 26 refs.

Snow samples were collected from surface layers of the Hercules Névé (Victoria Land, East Antarctica) during the austral summer 1993-94 in the framework of the Italian Scientific Expeditions to Antarctica. Lead concentration was determined directly on melted snow and without any preconcentration step by differential pulse anodic stripping voltammetry inside a clean chemistry laboratory (Class 100). Metal fallout fluxes were calculated using corresponding annual accumulation rates. Results showed that during the previous decade the lead content of antarctic snow had decreased markedly. This trend, which confirms previous results obtained in other sites of Victoria Land has been related to the corresponding decrease in the consumption of lead as a gasoline additive in the countries of the Southern Hemisphere. (Auth. mod.)

#### F-57131

Mayer, C., **Numerical modelling of the transition zone between an ice sheet and an ice shelf** [Numerische Modellierung der



Übergangszone zwischen Eisschild und Schelfeis], *Berichte zur Polarforschung*, 1996, No.214, 150p., In German with English summary. Refs. p.131-138.

The report examines the problem of the stability of the ice sheet covering West Antarctica, the ice shelf, and the glacial transition zone between them. Previous studies of the unstable nature of the region are discussed. Two- and three-D models are presented, precise definitions of finite differences are given, and experiments with the ICEMINT model are reviewed. Ice sheet and ice shelf schematic studies are investigated. The key problem and probably the most complex is modelling the transition zone between sheet and shelf.

#### F-57141

Oerter, H., ed, **Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996)**, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, 124p., Refs. passim. For individual papers see F-57142 through F-57162 or 51-3468 through 51-3488.

This report contains 26 written summaries of 32 talks presented at the 11th International Workshop of the Filchner-Ronne Ice Shelf Programme (FRISP). The meeting was held in Stockholm, Sweden, on June 13-14, 1996. The papers collected in this volume present an overview of FRISP and of the cooperation of participating groups. The ice-shelf ocean interaction is one of the major topics, a matter of both, field investigations and modelling. Calculating the mass balance along ice streams flowing into the Ronne Ice Shelf is undertaken by various means. The work on the Berkner I. ice cores continues as well as the evaluation of shallow ice cores with respect to accumulation studies.

#### F-57142

Corr, H., et al, **Basal melt rates along the Rutford Ice Stream, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996)**, compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.11-15, 2 refs.

When the Rutford Ice Stream crosses the grounding line and begins to float, it comes into contact with a water mass that is 1°C above the local pressure freezing point. The resultant melting produces a buoyant water mass that rises along the base of the ice shelf towards the ice front, helping to drive the sub-ice shelf circulation. This paper attempts to identify variations in the basal melt rate along Rutford Ice Stream over a 70 km section immediately downstream of the grounding line.

#### F-57143

Doake, C.S.M., **Strain-rate trajectories and isotropic points on Filchner Ronne Ice Shelf, Antarctica, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996)**, compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.16-22, 11 refs.

A finite element model of the Filchner-Ronne Ice Shelf has been used to generate the strain-rate field, using present day ice thicknesses and velocities around the grounding line. Isotropic points in the trajectories of the principal strain-rate reveal generic features of the flow pattern. Where ice streams enter the ice shelf they invariably slow down and form "stars". The grounded ice areas, such as Berkner I., Korff and Henry ice rises act as "lemons" or "monstars". A "lemon/monstar" isotropic point exists about 60 km from the ice front of Ronne Ice Shelf and there is also one at the ice front of Filchner Ice Shelf. Compressive arches of strain-rates stretch across the ice fronts of both the Ronne and Filchner. Seaward of these arches both principal strain-rates are extensive. The "top" of the compressive arches seem to be associated with the minimum restriction in the ice shelf bay. Comparison with the deduced strain-rate field for the configuration of Filchner Ice Shelf before the large iceberg calving event in 1986 suggests that when the Ronne ice front calves, the new ice front will reach back to the approximate position of the "lemon/monstar" isotropic point. (Auth.)

#### F-57144

Gerland, S., et al, **Continuous density measurements on the ice core B25 from Berkner Island, Antarctica, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996)**, compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and

Marine Research, 1996, p.23-24, 7 refs.

During a British-German expedition, 3 ice cores with lengths of more than 100 m were drilled at the north and south domes of Berkner I. After an 181 m long ice core was drilled on Thyssenhöhe (south dome), density against depth was measured by means of a nondestructive technique using gamma-ray beam attenuation. The absolute accuracy of a single measurement is 2%. These high resolution density measurements will be used to determine accumulation rates and they will provide a key parameter for the planned investigation of mechanical properties of firn and ice. It was possible to measure density quasi-continuously over almost the whole core due to the good core quality. The general trend of increasing density with depth is very well displayed in a figure.

#### F-57145

Graf, W., Oerter, H., Mayer, C., Lambrecht, A., Minikin, A., **Accumulation rates along the Foundation Ice Stream, Filchner-Ronne-Schelfeis, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996)**, compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.25-31, 10 refs.

The authors focus on the  $^3\text{H}$  dating of three firn cores, GLB-07, GLB-01 and GLB-04 and compare the  $^3\text{H}$  and ECM dating at site 930. Accumulation rates along ice flow lines on the Ronne Ice Shelf,  $^{18}\text{O}$  content of the near surface firn layers along an ice flow line on Foundation Ice Stream, and relationship between the isotopic content of the near surface layers and the 10 m firn temperature are discussed.

#### F-57146

Grosfeld, K., Gerdes, R., Determann, J., **Thermohaline circulation beneath and in front of Filchner Schelfeis, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996)**, compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.32-37, 16 refs.

From oceanographic transects along the Filchner-Ronne Ice Shelf edge, two major source regions for the outflow of Ice Shelf Water are known, the Ronne Depression in the west and the Filchner Depression in the east. In this paper, the authors focus on the Filchner Depression, which is believed to be more efficient with respect to Weddell Sea Bottom Water formation, since water masses colder than -2.2°C leave the ice shelf cavity. A 3-dimensional ocean general circulation model for the simulation of the thermohaline circulation beneath an ice shelf, and its interaction with the open ocean, is available.

#### F-57147

Jacobs, S., Hellmer, H., Jenkins, A., **WAIS underbelly melting at Pine Island Glacier?, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996)**, compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.38-40, 11 refs.

This article deals with processes that shape the West Antarctic Ice Sheet (WAIS) periphery. It concerns the Pine Island Glacier (PIG), which drains a catchment basin of ca. 200,000 km<sup>2</sup> into the SE Amundsen Sea. Circumpolar Deep Water (CDW) penetrates the deeper regions of the continental shelf along much of the Amundsen and Bellingshausen coastline, bringing water nearly 4°C above the in-situ freezing point to the 1080-m deep cavity opening. The PIG grounding line is >1200 m below sea level with a steeply-sloping base, facilitating upwelling of this CDW, which melts a mean 10-12 m/yr off the base. These values result from independent glaciological mass balance calculations, a simple salt-box model, and a 2-D numerical model of the sub-ice thermohaline circulation. With outflows well above the freezing temperature, the ocean circulation removes about half the ice that crosses the grounding line.

#### F-57148

Jenkins, A., **Glaciological fieldwork on Rutford Ice Stream, Carlson Inlet and Evans Ice Stream, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996)**, compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.41-42.



Fieldwork undertaken during Jan. and Feb. 1996 formed the concluding phase of two earlier field programs, which were started in 1993-94. Both programs were designed to gather information on the motion of the ice streams draining from Palmer Land and Ellsworth Land into the western part of Ronne Ice Shelf. The earlier program focused on Rutford Ice Stream and included the deployment of radar reflectors and a detailed study of the shear margin, while the latter involved the establishment of radar reflectors on Carlson Inlet and Evans Ice Stream. All sites are shown in a figure.

#### F-57149

Johnson, M., Jenkins, A., **Oceanographical observations in Ronne entrance**, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996), compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.43-46, 3 refs.

The 1996 Ronne Entrance cruise south of George VI Ice Shelf (GVIIS), on the naval ice patrol ship HMS *Endurance*, measured 50 conductivity-temperature-depth (CTD) water column profiles and collected a total of more than 400 water samples for instrument calibration and tracer studies. The aim was to complete an oceanographic survey of the water masses interacting with GVIIS, to study their circulation, and investigate the evolution of meltwater derived from the ice shelf. This new data will form an addition to earlier work in Ronne Entrance and GVIIS and will be used to investigate the mechanisms that control the oceanic environment.

#### F-57150

Jonas, M., Vaughan, D.G., **ERS-1 SAR mosaic of Filchner-Ronne-Schelfeis**, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996), compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.47-49, 3 refs.

The interpretation of optical and radar imagery on Filchner-Ronne Ice Shelf was carried out for validation and verification of the high accurate DEM (Digital Elevation Model) derived from the ERS radar altimetry during the ESAMCA-project (Exploitation of satellite altimetry for the monitoring of climate-related change of antarctic ice shelves). An image mosaic produced from ERS-1 SAR scenes acquired, processed and interpreted by BAS and IFAG is introduced.

#### F-57151

Lambrecht, A., Mayer, C., Nixdorf, U., Oerter, H., **Glaciological investigations in the grounding line area of the Foundation Ice Stream**, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996), compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.50-54.

The mass-balance of the Antarctic Ice Sheet, especially the outflow across the grounding line areas, is discussed. The Foundation Ice Stream (FIS) contributes a major share of the total mass flux into the eastern part of the Ronne Ice Shelf. There was still a lack of data in the grounding line area of the FIS. To fill this data gap and complete previous studies in the northern part of the eastern Ronne Ice Shelf, a glaciological and geodetic program was initiated during the *Filchner V* campaign in austral 1994-95.

#### F-57152

Makinson, K., **Hot water drilling on Ronne Ice Shelf 1995/96**, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996), compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.55-57, 3 refs.

During the 1995-96 field season the BAS hot water drill was used to create an access hole at Site 3, 17 km west of Korff Ice Rise. The ice was found to be 825 m thick, overlying a water column 485 m deep. CTD profiles and water samples were obtained via the access hole using slimline oceanographic probes. Finally, a permanent oceanographic mooring and thermistor cable were deployed for long term measurements.

#### F-57153

Makinson, K., Nicholls, K.W., **Modelling tidal currents beneath Filchner-Ronne Ice Shelf**, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996), compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research,

1996, p.58-67, 6 refs.

Filchner-Ronne Ice Shelf covers an area of almost 450,000 km<sup>2</sup>. Isolated from atmospheric forcing, it is likely that tidal currents provide the dominant source of energy for mixing water masses in the sub-ice shelf environment. The tidal model used in this work covers the area 71° to 84°S and 15° to 90°W and has a grid size of 1/4° longitude by 1/15° latitude, corresponding to approximately 7-3.5 km by 7 km. Based on depth-averaged equations, the model is driven by sea surface elevation data along the boundary at 71°S and 15°W, given by a regional model that was itself driven by the Schwiderski (1980) model. The model has been used to investigate the effect of tidal activity on the interaction between the Filchner-Ronne Ice Shelf and the underlying ocean, in particular the contribution of tides to vertical mixing in the sub-ice shelf environment.

#### F-57154

Miners, W.D., Peel, D.A., Mulvaney, R., **Using DEP and ECM to produce a chronology at Berkner**, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996), compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.68-71, 7 refs.

During the 1994 field season several ice cores were collected from Berkner I. Using the electrical conductivity measurement (ECM) and the dielectric profile (DEP), the ice cores from Reinwarthöhe (R1) and Thyssenhöhe (B25) have been dated. The electrical logging started at depths of 1.65 m for Reinwarthöhe and 1.97 m for Thyssenhöhe. To link the age at the top of the drilled ice cores to the snow surface, a combination of the snow pit stratigraphy and near surface density measurements were used. (Auth. mod.)

#### F-57155

Mulvaney, R., et al, **Berkner Island Project: isotopic and chemical trends in the ice core data**, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996), compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.72-77, 5 refs.

In Jan. and Feb. 1995, two medium depth ice cores were retrieved from Berkner I. with the objective of reconstructing a high resolution record of climate and environmental change of the past millennium. The deepest of the cores (B25) that reached a depth of 182 m, was collected with an AWI electromechanical drill at a site 5 km to the south of the southern dome, Thyssenhöhe. The second core, R1, which reached 152 m, was collected using a BAS drill at the north dome, Reinwarthöhe. An accumulation rate of about 0.2 m water at Reinwarthöhe implies an age at the bottom of the R1 core of around 600 years, while the B25 core from Thyssenhöhe with an accumulation rate of about 0.14 m water has an age of approximately 1200 years.

#### F-57156

Näslund, J.O., Holmlund, P., **Datasets on bed topography and ice sheet altitude for numerical modelling of the Maudheimvidda Ice Sheet, East Antarctica**, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996), compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.78-85, 14 refs.

The purpose of modelling the ice sheet in western Queen Maud Land is twofold. The first aim is to study changes in ice sheet configuration when simulating the cooler climate of the Quaternary glacials and climates warmer than the present. This part includes a special study of the stability of the present Veststraumen ice stream. The second purpose is to investigate the age relationship between the ice sheet and the previously mapped subglacial landforms. The results will be used to test whether it is likely or not that the subglacial cirques and glacial valleys have been covered by wet-based erosive ice during the Quaternary. In addition, the model results will be used for discussing the origin and age of subaerial striae on nunataks, found up to 700 m above the present ice sheet surface.

#### F-57157

Nicholls, K.W., Makinson, K., Johnson, M.R., **Oceanographic measurements made at Site 3: preliminary results**, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996), compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for



Polar and Marine Research, 1996, p.86-93, 5 refs.

Any changes in climate will first affect the Ronne-Filchner Ice Shelf system via the ocean. In order to predict the likely impact of past and future changes in climate on the ice shelf, numerical models must simulate the present-day sub-ice shelf oceanographic conditions accurately. Some conclusions can be drawn about the basal mass balance of the ice shelf by observing the way in which melting and freezing affect the flow of the ice. This also allows some qualitative conclusions about the water flow immediately beneath the ice shelf. However, direct oceanographic measurements are required to determine the conditions throughout the water column and to deduce water flows quantitatively. During Jan. 1996 the BAS hot-water drill was used to create an access hole through 825 m of ice at Site 3, some 17 km west of Korff Ice Rise. It was also hoped that the data would provide a test for some of the results of a three-dimensional ocean model.

#### F-57158

Riedel, B., Resnik, B., Ritter, B., Niemeier, W., **GPS observations at the grounding zone of the Foundation Ice Stream**, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996), compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.96-101, 3 refs.

The main emphasis of the geodetic fieldwork in 1995 was the registration of geometry and its changes of the grounding line of the Foundation Ice Stream with satellite and terrestrial observations. A detailed report about the fieldwork along Foundation Ice Stream was given in FRISP report no.9. The observed grounding line net followed a flow line of Foundation Ice Stream and had an extension of  $5 \times 80 \text{ km}^2$  at  $83^\circ 10'S$ . The processing of airborne radio echo sounding data and seismic data of the AWI reveals that the grounding line is located 40 km further south than the last group of stations 950.

#### F-57159

Rist, M.A., **Fracture mechanics of ice shelves**, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996), compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.102-105, 7 refs.

Tensile brittle fracture in any polycrystalline material occurs because of the presence of sharp flaws or cracks. Such imperfections act to concentrate the applied stress field so that a single small crack can propagate to form a macroscopic fracture. Ice shelf crevasses are large-scale tensile fractures that must have formed from much smaller flaws. If a flaw is introduced into a large enough stress field it will propagate rapidly under elastic conditions. As the initial flaw penetrates into an ice shelf it experiences a changing stress field that normally causes it to stabilize again at some point. By quantifying this process for a typical ice shelf a useful insight can be gained into the mechanics of crevasse formation and the implications for overall ice shelf stability.

#### F-57160

Steinhage, D., Blindow, N., **Results of short pulse radio echo sounding on Thyssenhöhe, Berkner Island, Antarctica**, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996), compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.106-109, 5 refs.

In this report the authors discuss the ongoing analysis of the short pulse radio echo sounding carried out in Feb. 1995 on Berkner I., focusing at the area of the Thyssenhöhe. On this southern dome, internal layers and bedrock were mapped along ten south-north oriented profiles, which are each 20 km long and have a spacing of 1 km. The rectangular area of this survey is marked in a figure.

#### F-57161

Vaughan, D.G., Jonas, M., **Measurements of velocity of Filchner-Ronne Ice Shelf**, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996), compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.111-116, 19 refs.

The measurement of velocity on Filchner-Ronne Ice Shelf (FRIS) is of prime importance in determining the state of balance of the ice shelf and for testing ice shelf models. Despite the obvious promise of the method,

interferometric SAR has yet to yield fields of ice shelf velocity on a routine basis and for the present one is limited to using velocities calculated from more conventional methods. Here, the authors present a digest of published velocity data (92 points), together with new measurements made by measuring the displacement of features between satellite images (221 points). The datasets are in general agreement and together will give adequate coverage for many applications. (Auth.)

#### F-57162

Walden, M.C., Corr, H.F.J., **Digitally generated and compressed chirp for use in an airborne radar system in Antarctica**, Filchner-Ronne Ice Shelf Programme (FRISP), Report No.10 (1996), compiled by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1996, p.117-122, 5 refs.

The operation of the British Antarctic Survey (BAS) radar and a sample of the BAS 95-96 antarctic field season data are discussed. In particular, the advantage of using pulse compression with chirp is highlighted. A disadvantage of pulse compression techniques is the presence of long duration sidelobes before and after the main response. Sidelobes from strong reflectors may mask the main responses of weak returns. To minimize this it is necessary to use short duration pulses. For a given RF bandwidth, short duration pulses are also less susceptible to amplitude and phase errors in the system which cause unwanted spurious responses.

#### F-57171

Heil, P., Allison, I., Lytle, V.I., **Seasonal and interannual variations of the oceanic heat flux under a landfast antarctic sea ice cover**, *Journal of geophysical research*, Nov. 15, 1996, 101(C10), p.25,741-25,752, 36 refs.

A multilayer thermodynamic model is used to simulate sea ice growth for 12 years between 1958 and 1986 in the vicinity of the Australian station Mawson on the coast of East Antarctica. The atmospheric forcing data for the model are derived from radiosonde profiles and from surface measurements. Global radiation data are available for 4 years, and these measurements are used for comparison with the results of a Zillman-type model for global radiation. Combining the thermodynamic model with sea ice thickness measurements for 12 years, the energy balance equation for the oceanic heat flux is solved. The oceanic heat flux is not constant but changes with time within the year and from year to year. In general, the oceanic heat flux increases from the start of the fast ice formation season in early Apr. until it breaks out in Dec. or Jan. To compare the calculated oceanic heat fluxes for different years, the total ice season is divided into three characteristic time regimes of the sea ice growth and the averaged oceanic heat fluxes calculated for each regime. For the first regime (through Aug.) the mean flux is  $2.7 \text{ W/m}^2$ , for the middle regime (Sep.) it is  $8.4 \text{ W/m}^2$ , and for the final regime (Oct-Jan.) it is  $17 \text{ W/m}^2$ . Comparison of passive microwave data of sea ice extent and concentration with the model results reveals a correlation between the magnitude of the oceanic heat flux and local features such as polynyas. (Auth. mod.)

#### F-57177

Trudinger, C.M., et al, **Modeling air movement and bubble trapping in firn**, *Journal of geophysical research*, Mar. 27, 1997, 102(D6), p.6747-6763, 38 refs.

A finite difference model for gas diffusion and bubble trapping in firn is described. The model uses prescribed profiles of density, open and closed porosity, and diffusivity to determine the diffusion and trapping processes. The model is calibrated and tested by using measured air composition in the firn at the DE08-2 site on Law Dome. In particular, the authors focus on carbon dioxide ( $\text{CO}_2$ ), methane ( $\text{CH}_4$ ), and sulfur hexafluoride ( $\text{SF}_6$ ), which have well-determined atmospheric records. These trace gases are used to tune the diffusivity-porosity relationship, which is the most uncertain of the model inputs. The model quantifies the smoothing effect of the firn diffusion and bubble trapping on atmospheric signals. The fully corrected  $\delta^{13}\text{CO}_2$  record from the DE08-2 firn is compared with the history of Cape Grim direct atmospheric measurements with excellent agreement. (Auth. mod.)

#### F-57205

Høydal, O.A., **Force-balance study of ice flow and basal conditions of Jutulstraumen, Antarctica**, *Journal of glaciology*, 1996, Vol.42, p.413-425, 18 refs.



Stresses and velocities at depth are calculated across Jutulstraumen, an ice stream in Queen Maud Land, draining about 1% of the antarctic ice sheet. The force-balance study is based on data from kinematic GPS measurements on three strain nets, each consisting of 3 x 3 stakes. The maximum measured velocity is 443 m/a and the velocity variation over short distances is large compared with studied ice streams in West Antarctica. The surface topography together with the measured velocities across the profile indicate that the bottom topography has a great influence on the flow direction, even where the ice thickness is more than 2000 m. The heat produced by sliding and internal deformation is sufficient to keep the base at the pressure-melting point. The annual basal melting is estimated to be about 60 mm. The mass flow calculated by the force-balance method is between 87 and 96% of pure plug flow. (Auth. mod.)

#### F-57207

Wendler, G., Ahlnas, K., Lingle, C.S., **On Mertz and Ninnis Glaciers, East Antarctica**, *Journal of glaciology*, 1996, Vol.42, p.447-453, 15 refs.

Two large glacier tongues, which extend substantially across the coastline of King George V Land in East Antarctica, have been studied by remote sensing (synthetic aperture radar, JERS-1). The tongue of Mertz Glacier is in a state of advance, while the Ninnis Glacier tongue is retreating. The distinctive surface structure and the form of the glacier tongues indicates that they are floating. While the tongue of Ninnis Glacier has lost about two-thirds of its area since 1913, the Mertz Glacier tongue has advanced substantially and has about doubled its areal extent over the same time period. The annual movement of the tongue of Mertz Glacier was determined as about 1.2 km. This is close to the value of the advance of the tip of the tongue since 1963, which was determined as 0.9 km/year. (Auth. mod.)

#### F-57208

Bindshadler, R., Vornberger, P., Blankenship, D., Scambos, T., Jacobel, R., **Surface velocity and mass balance of Ice Streams D and E, West Antarctica**, *Journal of glaciology*, 1996, Vol.42, p.461-475, 24 refs.

Over 75,000 surface-velocity measurements are extracted from sequential satellite imagery of Ice Streams D and E to reveal a complex pattern of flow not apparent from previous measurements. Horizontal and vertical strain rates, calculated from surface velocity, indicate that the bed experiences larger basal shear where the surface of these ice streams is rougher. Ten airborne-radar profiles and one surface-based radar profile of ice thickness make possible the calculation of mass balance for longitudinal sections of each ice stream. Systematic errors continue to limit the ability of the flux-differencing technique used here to resolve local variations in mass balance. Nevertheless, significant local variations in mass balance are revealed, while, overall, Ice Streams D and E are in approximate equilibrium. An earlier estimate of the net mass balance for Ice Stream D is improved. (Auth. mod.)

#### F-57210

Siegert, M.J., Dowdeswell, J.A., **Spatial variations in heat at the base of the antarctic ice sheet from analysis of the thermal regime above subglacial lakes**, *Journal of glaciology*, 1996, Vol.42, p.501-509, 18 refs.

The authors have used a one-dimensional vertical heat-transfer equation to determine theoretical temperature values for the ice-sheet base above 77 subglacial lakes identified from airborne radio-echo-sounding data covering 50% of Antarctica. Variations in temperature to below the pressure-melting temperature over lakes are due to either estimated geothermal heat flux or a neglect of heat derived from (a) internal ice deformation and (b) basal sliding, in the thermal model. Results indicate that, when the geothermal heat flux is set at 54 mW/m<sup>2</sup>, the ice-sheet base above 70% of the known antarctic subglacial lakes is calculated to be at the pressure-melting value. For the ice sheet above subglacial lakes located hundreds of kilometers from the ice divide, using the same thermal model, loss of heat due to vertical advection is calculated to be relatively high. As distance from the ice divide increases, so does the amount of heat due to internal ice deformation and basal sliding. (Auth. mod.)

#### F-57211

Raymond, C., Weertman, B., Thompson, L., Mosley-Thompson,

E., Peel, D., Mulvaney, R., **Geometry, motion and mass balance of Dyer Plateau, Antarctica**, *Journal of glaciology*, 1996, Vol.42, p.510-518, 11 refs.

Geodetic surveying and ground-based radar profiling were used to determine geometry and surface motion of the ice sheet on the Dyer Plateau, in the vicinity of an ice-core site on a local dome. Vertical strain measurements in the core hole constrain the depth profile of vertical velocity. These geophysical measurements are used to analyze the profiles of density and annual layer thickness measured on the ice core to estimate the current mass balance of the ice column and the past history of accumulation rate. Consideration of horizontal and vertical mass-flow divergence shows that the profiles of density and vertical velocity are not fully consistent with steady state. Mean density of the firn layer appears to be increasing, which leads to the deduction of a small rate of mass increase. Over the last 200 a there has been a gradual increase in accumulation rate. (Auth. mod.)

#### F-57212

Clow, G.D., Saltus, R.W., Waddington, E.D., **New high-precision borehole-temperature logging system used at GISP2, Greenland, and Taylor Dome, Antarctica**, *Journal of glaciology*, 1996, Vol.42, p.576-584, 18 refs.

The authors describe a high-precision borehole-temperature (BT) logging system developed at the United States Geological Survey (USGS) for use in remote polar regions. Calibration, operational and data-processing procedures, are discussed, and an analysis of the measurement errors presented. The system is modular to facilitate calibration procedures and field repairs. To illustrate this capability, the authors sample data from the 3 km deep borehole at GISP2, Greenland, and from a 130 m deep air filled hole at Taylor Dome. The precision of the incremental Taylor Dome measurements varies from 0.11 to 0.32 mK, depending on the wind strength during the experiments. With this precision, temperature fluctuations and multi-hour trends in the BT measurements correlated well with atmospheric-pressure changes. (Auth. mod.)

#### F-57239

Yoshida, Y., **Research note on sea ice in the vicinity of Showa Station, Antarctica** [Nankyoku Showa kichi shuhen no kaihyo kenkyu noto], *Rissho daigaku Bungakubu kenkyu kiyo (Rissho [Nichiren Buddhist] University, Tokyo. Faculty of Letters. Research bulletin)*, Mar. 1997, No.13, p.35-47, In Japanese. 24 refs.

A general review is presented of observations from 1957-1991 on the extent and variations in sea ice, both floating ice and fast ice, between summer and winter in Lützow-Holm Bay. Incidents are cited when even in the summer, navigation was difficult in the fast ice because polynyas and leads open and close without warning. In the winter, polynyas have formed in first year ice, and polynyas and leads were also observed in fast ice in the winters of 1968, 1980, and 1983, apparently associated with blizzards. In all seasons, the fast ice is subject to the action of wind, tides and particularly, glacier tongues, which form cracks in the ice and may impede vehicle traffic.

#### F-57251

McKnight, D.M., Tate, C.M., **Canada Stream: a glacial meltwater stream in Taylor Valley, South Victoria Land, Antarctica**, *Journal of the North American Benthological Society*, Mar. 1997, 16(1), p.14-17, 18 refs.

The streams in the McMurdo Dry Valleys contrast with streams in many temperate watersheds because of their unique hydrology, the lack of organic matter inputs from the surrounding landscape, and the perennial nature of the algal mats. The studies of Canada Stream and other streams in the McMurdo Dry Valleys conducted by scientists participating in the New Zealand Antarctic Program in the 1980s provide a solid foundation for further studies of the ecology of these streams. Using data from these studies, the authors have estimated the magnitude of organic matter production and storage in Canada Stream. The sum of the export of organic matter as FBOM and DOM carried by the stream is 263 kg/y. GPP was calculated as 2 times NPP; thus one can multiply NPP by the streambed area to obtain an annual net production of organic matter in the stream of



1701 kg/y. This value is 6.4 X the export carried by the stream, which indicates that organic matter is accumulating on an annual basis in the stream. This conclusion is consistent with the perennial nature of the algal mats.

#### F-57311

Kozlovskii, A.M., **Main characteristics and typification of the processes of formation and growth of the Atlantic ice mass** [Osnovnye cherty i tipizatsiia protsessov formirovaniia i razvitiia Atlanticheskogo ledianogo massiva], *Rossiiskaia Antarkticheskaiia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No.117, p.39-44, In Russian.

The author discusses various aspects of the ice regime of the Weddell Sea and South Atlantic Ocean. Multi-year ice along the east coast of the Antarctic Peninsula is classified as accumulated sea ice with a cohesion factor of 7 and above. Changes in the speed and extent of the breakup of the ice in spring and early summer are indicators of seasonal changes in the ice regime of the Weddell Sea. The thinning of the ice which occurs between September and November known as the Weddell Sea polynya is thought to be associated with warmer deep water currents which melt the ice from below. The formation of the polynya, the melting of sea ice in the marginal ice zone due to the effects of atmospheric and ocean circulation along the eastern edge of the Weddell Sea, and the hydrodynamic processes taking place in the region of the Maud rise, all require further long-term study.

#### F-57312

Romanov, A.A., Korotkov, A.I., **Phenomenological diagram of the quasi-biennial cycle of variation in the ice cover of the southern ocean** [Fenomenologicheskaiia skhema kvazidvukhletnei tsiklichnosti kolebaniï ledovitosti iuzhnogo okeana], *Rossiiskaia Antarkticheskaiia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No.117, p.44-48, In Russian. 6 refs.

The authors discuss the patterns of spatial and temporal variation and the interrelationships between oceanic and atmospheric processes which are fundamental to the mechanisms of evolution and decay in the sea ice zone of Antarctica. A diagram shows both direct and feedback relationships affecting ice cover in the southern ocean, including meridional atmospheric circulation, advection, thin ice zones and polynyas, and the main breakup areas. Inter-annual variation is seen as a universal mechanism affecting ice cover in both the Arctic and Antarctic, the main difference between the poles being the increased frequency with which the phenomenon occurs in the Antarctic within a varying biennial cycle. The diagram facilitates forecasting of ice conditions for navigation, the likely growth rate of stationary polynyas, and the time at which a new cycle of ice accumulation will commence.

#### F-57313

Romanov, A.A., Korotkov, A.I., **Formation and variability of Antarctic sea-ice as components of the polar climatic system** [Formirovanie i izmenchivost' morskikh Antarkticheskikh l'dov kak sostavnoi chasti poliarnoi klimaticheskoi sistemy], *Rossiiskaia Antarkticheskaiia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No.117, p.48-54, In Russian. 27 refs.

The authors discuss recent progress in the understanding of the complex variables and feedback mechanisms affecting the sea ice regime in the southern ocean, which has resulted in a more holistic view replacing the traditional hierarchical approach to the subject. They suggest that statistical methods of ice forecasting could be used to supplement traditional methods which are heavily reliant on data which can be difficult to obtain.

#### F-57314

Romanov, A.A., Korotkov, A.I., Churun, V.N., **Principal results of ice observation on the WWGS-89 expedition on the NES Akademik Fedorov** [Osnovnye rezul'taty ledovykh nabliudenii v ekspeditsii WWGS-89 na NES "Akademik Fedorov"], *Rossiiskaia Antarkticheskaiia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No.117, p.54-58, In Russian. 7 refs.

The main results of an international expedition to investigate the winter conditions in the Weddell gyre in September and October are summarized. These include details of the thickness, temperature and salinity of

the ice and snow cover. Figures show the advection of ice in the Weddell gyre and the changes in average daily values for air temperature, ice temperature, the temperature of the water immediately below the ice, and the salinity of the ice in an area selected for testing from Oct. 8-16, 1989.

#### F-57316

Galkin, S.I., Tarabukin, I.A., Gun, S.E., Nazarov, V.D., **Experimental determination by remote radiometry of the density of snow cover on a runway for heavy aircraft with wheeled landing gear in the vicinity of the Molodezhnaya AMC (Antarctic Meteorological Centre)** [Eksperimental'noe opredelenie plotnosti snezhnogo pokrytia VPP dlia tiazhelykh samoletov s kolesnym shassi AMTs Molodezhnaia distantsionnym radiometricheskim metodom], *Rossiiskaia Antarkticheskaiia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No.117, p.61-68, In Russian. 5 refs.

The authors describe a method of measuring the density of snow cover on a runway, developed during the 1988-89 field season at a site in Enderby Land 12 km from the Soviet station at Molodezhnaya. Radiometric observations were carried out at temperatures from 0 to -30°C on all sections of the runway during its preparation and use. Details of radiothermal measurements, calculations and interpretation of the results are given.

#### F-57319

Nazarov, V.D., Tarabukin, I.A., **Theoretical possibility of remote radiometric determination of the density of snow cover** [Principial'nye vozmozhnosti distantsionnogo radiometricheskogo opredeleniia plotnosti snezhnykh pokrytii], *Rossiiskaia Antarkticheskaiia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No.117, p.79-83, In Russian. 2 refs.

The authors describe the method and calculations required for remote radiometric determination of the density of snow cover, in the context of assessing the condition of landing strips in Antarctica.

#### F-57322

Korotkov, A.I., Podmorin, V.G., Ponomarev, V.A., **Periodic calving from the West Ice Shelf** [Ocherednoi otkol Zapadnogo shel'fovogo lednika], *Rossiiskaia Antarkticheskaiia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No.117, p.98, In Russian.

The authors report briefly on the calving in 1991 of an iceberg over 4,000 km<sup>2</sup> in area from the northwestern edge of the West Ice Shelf on Wilhelm II Coast, Antarctica.

#### F-57323

Lang, R.M., Blaisdell, G.L., D'Urso, C., Reinemer, G., Leshner, M., **Processing a high strength snow for South Pole compacted snow runway: test results from winter 1992-1993**, International Snow Science Workshop, Snowbird, UT, Oct. 1994. ISSW '94. Proceedings. Merging of theory and practice, 1994, p.156-175, 15 refs.

Field studies were required in order to identify the optimum snow processing technique that will produce a compact and bonded snow suitable for the construction of high strength snow roads and runways. Improving the strength of the snow runway at Amundsen-Scott Station would be required if the United States Antarctic Program considers wheeled aircraft as a possible delivery system. The types of conventional snow processing equipment that produces the highest snow strength were quantitatively verified using image analysis techniques and other on-site testing methods. Tests were performed in West Yellowstone, MT where the snow properties and winter ambient temperatures are as analogous as possible to those at Amundsen-Scott during the austral summer and in other arctic and antarctic regions. The processed snow was tested for hardness (strength) using a soil penetrometer, and strength values were correlated to bond density. The temperature distributions in the processed snow were monitored using a thermocouple stack and CR10 datalogger and are correlated to strength increases or decreases. Test results indicate that a powered tiller with a relatively dense tooth population provided the highest strength snow. (Auth. mod.)



**F-57331**

Long, D.G., **Observations of polar ice using enhanced resolution microwave scatterometer data**, *Technical digest series*, 1995, Vol.2, Optical Remote Sensing of the Atmosphere. Topical Meeting, Salt Lake City, UT, Feb. 5-9, 1995. Postconference edition, p.52/TuA1-1-TuA1-4/55, 5 refs.

**DLC QC871.067 1995**

Increasing interest in the role of ice sheets in regulating global climate has created a need for synoptic interannual recording and monitoring of the earth's major ice sheets. Based on their ability to "see" into ice, microwave remote sensing instruments are well-suited for monitoring the polar regions. In this paper an algorithm is applied to create enhanced resolution images from Seasat and ERS-1 scatterometer data over. Time series of medium-scale radar images for Greenland and Antarctica and the surrounding seas are presented. The growth and shrinkage of the southern polar sea-ice throughout a full annual cycle is illustrated with the seasonal cycle of patterns on the Antarctic and Greenland Ice Sheets clearly evident. Using the time series and simple scattering models, the locations of key ice facies in Greenland are determined.

**F-57335**

Nereson, N.A., Waddington, E.D., Raymond, C.F., Jacobson, H.P., **Predicted age-depth scales for Siple Dome and inland WAIS ice cores in west Antarctica**, *Geophysical research letters*, Nov. 1, 1996, 23(22), p.3163-3166, 22 refs.

Geophysical data are used with ice flow models and generalized accumulation histories to estimate age and annual layer thickness versus depth for two anticipated ice core sites in West Antarctica: Siple Dome and an inland site on the West Antarctic Ice Sheet. This modeling experiment predicts that  $10^4$  year-old ice is at ca. 50% depth and  $10^5$  year-old ice is at ca. 90% depth at both sites. Both of these cores could contain climate information through the last glacial cycle with annual resolution through the Holocene. The predicted similarity in resolution and record length between the two cores suggests that they could be compared to obtain both spatial and temporal information about the paleoclimate and history of the West Antarctic ice sheet. (Auth. mod.)

**F-57341**

Steig, E.J., **Beryllium-10 in the Taylor Dome ice core: applications to antarctic glaciology and paleoclimatology**, Seattle, University of Washington, 1996, 167p., University Microfilms no. 96-30116, Ph.D. thesis. Refs. p.150-167.

A continuous profile of beryllium-10 obtained for a 554-m ice core is used to establish an accumulation-rate history at Taylor Dome, taking into account remaining uncertainties in production rates, deposition mechanisms, and atmospheric mixing processes. A preliminary interpretation of the accumulation-rate record indicates that climate conditions at Taylor Dome are strongly influenced by conditions in the Ross Sea, particularly the configuration of the Ross Ice Shelf. These results show that the Taylor Dome core can be used to provide new constraints on regional climate over the last 130,000 years, complementing the terrestrial and marine geologic record from the Dry Valleys, Transantarctic Mountains and western Ross Sea. (Auth. mod.)

**F-57345**

Geiger, C.A., **Investigation of dynamic sea ice processes in the Weddell Sea during 1992**, Hanover, Dartmouth College, 1996, 378p., University Microfilms order No. 96-39440, Ph.D. thesis. This thesis was partially funded by CRREL (No. 5-36686.140). Refs. p.369-378.

Through a series of case studies, signal processing and statistical tools, analyses of dynamic sea ice processes of drift, deformation, and ice pack expansion and decay are investigated for the Weddell Sea region during 1992. Cavitating fluid (CAV) and viscous-plastic (VP) models are the most widely used ice models in sea ice, ocean and climate communities. Examination of these and observations are presented in order to identify the external (air/ocean) and internal (ice) forces that affect specific processes. Inconsistencies between processes in models and observations are isolated and examined with suggestions given for the next generation of ice models. Key findings are as follows: Observationally, from ISW 1992, ice velocity in western Weddell is found to be driven by low frequency forcing (>one day), while subdaily frequencies drive ice deformation.

Mechanistic studies increase understanding in simulated ice performance under idealized conditions. In the models, annual expansion during winter months is dominated by air temperature at the ice edge and storms in the interior where sensible/latent heat fluxes are large, especially in leads. Suggestions for next generation models include a reformulation of the boundary layer and incorporation of high frequency tidal forcing. (Auth. mod.)

**F-57357**

Yueh, S.H., Kwok, R., Lou, S.H., Tsai, W.Y., **Sea ice identification using dual-polarized Ku-band scatterometer data**, *IEEE transactions on geoscience and remote sensing*, May 1997, 35(3), p.560-569, 29 refs. For another version see 51-2456 or F-56716.

This paper describes a classification algorithm using dual-polarized scatterometer measurements to identify the edge of the sea ice cover in both arctic and antarctic regions. The distinct polarization scattering signatures of sea ice and open water are discussed and illustrated with the dual-polarized radar measurements from the Seasat-A scatterometer (SASS). The analysis of SASS data suggests that the ratio of vertical and horizontal polarization backscatter, denoted as the copol ratio, is a useful discriminator of sea ice and open ocean. A simple classification algorithm using the thresholds of the copol ratio and backscatter levels is proposed. The feasibility of this algorithm is demonstrated using the SASS data from the single-sided, dual-polarization mode. The results indicate that the dual-polarized measurements from the NASA scatterometer (NSCAT) can be used to produce routine maps of sea ice edges. (Auth. mod.)

**F-57367**

Higham, M., Craven, M., **Surface mass balance and snow surface properties from the Lambert Glacier basin traverses 1990-94**, Australia. Cooperative Research Centre for the Antarctic and Southern Ocean Environment (Antarctic CRC). Research report, Mar. 1997, No.9, 129p., 17 refs.

Oversnow traverses have collected a variety of glaciological measurements around the interior drainage basin of the Lambert Glacier between 1989-90 and 1994-95. The main traverse route covers approximately 2000 km with elevations in the range 1000-3000 m. This report details the results of surface mass balance, 10-m firn temperature, stable isotope, density, microrelief, stratigraphy and climatology measurements made over the entire traverse route. The average surface mass balance over the major portion of the route above 2000 m elevation is 76 ( $\sigma=74$ )/kgm<sup>2</sup>/a (approximately 190 mm of snow equivalent per year). Spatially averaged snow surface mass balance (30 km smoothed) within the basin varies from lows around 30/kgm<sup>2</sup>/a to highs of 150/kgm<sup>2</sup>/a, major spatial changes in the net balance pattern being controlled primarily by topography. Interannual variability for the basin is high. Data from shallow cores also provide valuable information on the physical properties of the near-surface firn, but give no reliable estimate of past accumulation due to the overall low accumulation regime and wind redistribution which disturbs annual layers. (Auth. mod.)

**F-57369**

Oerlemans, J., Conrads, L.A., **Land ice and sea level change**, *Studies in environmental science*, 1995, No.65A, International Climate Change Research Conference, Maastricht, Dec. 6-9, 1994. Proceedings. Climate change research: evaluation and policy implications. Edited by S. Zwerver, R.S.A.R van Rompaey, M.T.J. Kok and M.M. Berk, p.375-380, 19 refs.

**DLC QC981.8.C5C6 1995**

A simple meteorological model has been developed to simulate the temperature and precipitation distribution over the antarctic continent. When run with appropriate boundary conditions (annual mean insolation and temperature at the ocean boundary), the model gives a satisfactory simulation of the meridional profiles of temperature and accumulation on the antarctic ice sheet (annual mean state).

**F-57370**

Bruno, M., Joos, F., **Terrestrial carbon storage during the past 200 years: a Monte Carlo analysis of CO<sub>2</sub> data from ice core and atmospheric measurements**, *Global biogeochemical cycles*, Mar. 1997, 11(1), p.111-124, Refs. p.122-124.



The authors have updated earlier deconvolution analyses using most recent high-precision ice core data from Law Dome for the last millennium and direct atmospheric CO<sub>2</sub> observations starting in 1958. The study interprets nonfossil emissions, that is, the difference between the increase in observed atmospheric plus modeled oceanic carbon inventory and fossil emissions, as biospheric carbon storage (release). Uncertainties in the CO<sub>2</sub> ice core data have been assessed using a Monte Carlo approach. A 2- $\sigma$  uncertainty for the nonfossil emissions (20-year averages) was found. The temporal evolution of the required biota sink is not compatible with conventional modeling of CO<sub>2</sub> fertilization. Thus it seems not likely that the cumulative sink of 76 GtC which is required to balance land use emissions during 1935 to 1990 can be explained by climate variations only. (Auth. mod.)

#### F-57382

Levchenko, V.A., et al, **Measurement of <sup>14</sup>CO<sub>2</sub> bomb pulse in firn and ice at Law Dome, Antarctica**, *Nuclear instruments and methods in physics research B*, Mar. 1997, 123(1-4), International Conference on Accelerator Mass Spectrometry (AMS-7), Tucson, AZ, May 20-24, 1996. Proceedings, p.290-295, 23 refs.

<sup>14</sup>CO<sub>2</sub> produced in the atmosphere by nuclear weapons testing in the 1960s is now incorporated in the air bubbles of antarctic ice. The high atmospheric radiocarbon growth rates through the period of tests and subsequent decline provide a unique and independent test for the smoothing of atmospheric CO<sub>2</sub> signals due to firn diffusion and bubble close off. The level of smoothing quantifies the time resolution with which atmospheric trace gas histories can be reconstructed from ice cores. In this paper, the methodologies for the preparation and AMS measurements of ice core and firn <sup>14</sup>CO<sub>2</sub> from high accumulation sites at Law Dome are detailed. The results are compared with predictions of a numerical model incorporating firn air diffusion and bubble close-off. The sample sizes, precision of measurements and sources of contamination are discussed for both firn and ice samples. (Auth.)

#### F-57441

Wu, X.R., Simmonds, I., Budd, W.F., **Modeling of antarctic sea ice in a general circulation model**, *Journal of climate*, Apr. 1997, 10(4), p.593-609, 64 refs.

A dynamic-thermodynamic sea ice model is developed and coupled with the Melbourne University general circulation model to simulate the seasonal cycle of the antarctic sea ice distribution. The model is efficient, rapid to compute, and useful for a range of climate studies. The thermodynamic part of the sea ice model is similar to that developed by Parkinson and Washington, the dynamics contain a simplified ice rheology that resists compression. The thermodynamics is based on energy conservation at the top surface of the ice/snow, the ice/water interface, and the open water area to determine the ice formation, accretion, and ablation. Simulated sea ice thickness and concentration are in good agreement with observations over most regions and serve to indicate the importance of advection and ocean drift in the determination of the sea ice distribution. (Auth. mod.)

#### F-57474

Van Ommen, T.D., Morgan, V., **Calibrating the ice core paleothermometer using seasonality**, *Journal of geophysical research*, Apr. 27, 1997, 102(D8), p.9351-9357, 32 refs.

High-resolution oxygen isotope measurements on the Dome Summit South (DSS) ice core from Law Dome provide a seasonal profile that is sufficiently stable and undistorted by biases in accumulation to permit comparison with measured temperature seasonality. This comparison yields an isotope-temperature relation with a gradient (d $\delta$ dT) of 0.44 $\pm$ 0.02 per mill/°C and provides a new method for exploring the isotope-temperature relationship at high-accumulation sites. If applied to the observed isotope record from the DSS core, which extends through the last glacial and beyond, this calibration suggests that at its coldest the last glaciation was ca. 13°C colder than present at this site (after correcting for elevation change). This finding compares with a temperature difference of ca. 8°C computed by using the local spatially derived calibration. (Auth. mod.)

#### F-57476

Scientific Committee on Antarctic Research, **SCAR report No.13, Nov. 1996**, Cambridge, UK, Scott Polar Research Insti-

tute, 1996, 37p.

This bulletin consists of 3 reports and 6 appendices: Report of the 1995 bipolar meeting of the GLOCHANT/IGBP-PAGES Task Group 2 on paleoenvironments from ice cores; Report of the 1995 meeting of the GLOCHANT Task Group 3 on ice sheet mass balance and sea-level (ISMAS); and Report of the 4th meeting of the Group of Specialists (GLOCHANT IV). The overall themes of the meetings were as follows: the update of major antarctic and Greenland drilling projects; the coordination of ice radar sounding surveys of the grounding zone of the Antarctic Ice Sheet and that of surface mass balance and ice velocities measurements; and the overview of the SCAR Global Change Programme and status reporting on each of the linkages with other SCAR groups and international organizations.

#### F-57486

De Veaux, R.D., Phelan, M.J., **Spatial cross-correlation of antarctic sea ice and seabed topography**, Princeton, NJ, Princeton University, 1990, 24p. + figs., N90-26451, 10 refs. Appendix B only, to U.S. National Aeronautics and Space Administration, Contractor report, NASA-CR-186815, not further identified.

Sea ice concentrations as observed about Antarctica by the Nimbus-7 Scanning Multichannel Microwave Radiometer (SMMR) satellite in 1983, show that throughout the sea ice, large-scale variations in sea ice concentration correlate systematically with variations in the topography of the seabed. A statistical image-processing filter was designed to extract local patterns of spatial cross-correlation over the entire sea ice field as it undergoes daily changes. Generally, high concentrations of sea ice occur over deep ocean, whereas areas of encavement, early dissipation and polynya formation develop over topographic features of high elevation. The results of spatial cross-correlation indicate a potential role for seabed topography in fluctuations in the sea ice about Antarctica. (Auth. mod.)

#### F-57505

Emery, W.J., Fowler, C.W., Maslanik, J.A., **Satellite-derived maps of arctic and antarctic sea ice motion: 1988 to 1994**, *Geophysical research letters*, Apr. 15, 1997, 24(8), p.897-900, 24 refs.

Standard image processing methods applied to Special Sensor Microwave/Imager data provide previously unseen details about sea ice motion in the arctic and southern oceans. Means calculated from daily ice motions for 1988-1994 confirm the basic circulation patterns established from drifting stations and buoys, but extend these observations to illustrate less well-known transport patterns in the arctic coastal zones and sub-arctic seas. In the Antarctic, the gridded motion fields show a nearly continuous westward transport along the antarctic coast, with well-defined regions of exchange between this East Wind Drift and the Antarctic Circumpolar Current. This detailed view of mean ice motion in the southern ocean is unique and presents a comprehensive overview not previously available for antarctic ice motions. (Auth. mod.)

#### F-57506

Hall, B.L., Denton, G.H., Lux, D.R., Schlüchter, C., **Pliocene paleoenvironment and antarctic ice sheet behavior: evidence from Wright Valley**, *Journal of geology*, May 1997, 105(3), p.285-294, 39 refs.

Investigations in Wright Valley, adjacent to the Transantarctic Mountains in East Antarctica, shed light on the question of whether high-latitude Pliocene climate was warm enough to cause widespread deglaciation of the East Antarctic craton with a concurrent Magellanic moorland-like environment. If Pliocene-age diatoms, presently in glaciogenic deposits high in the Transantarctic Mountains, had come from seaways on the East Antarctic craton, an expanding Late Pliocene ice sheet must have first eroded them from marine sediments and then deposited the diatoms at their present high-altitude locations. This hypothetical expanding glacier would have had to have come through Wright Valley. Glacial drift sediments from the central Wright Valley were mapped, sampled, analyzed, and <sup>40</sup>Ar/<sup>39</sup>Ar whole-rock dated. The evidence indicates that an East Antarctic outlet glacier has not expanded through Wright Valley, and hence cannot have overridden the Dry Valleys sector of the Transantarctic Mountains, any time in the past 3.8 myr. Rather, there was only moderate Pliocene expansion of local cold-based alpine glaciers and continuous cold-desert conditions in Wright Valley. Persistence of a cold-desert pale-



environment implies that the sector of the East Antarctic Ice Sheet adjacent to Wright Valley has remained relatively stable without melting ablation zones since at least 3.8 Ma, in Early Pliocene time. (Auth. mod.)

#### F-57512

Jokat, W., ed, Oerter, H., ed, **Expedition ANTARKTIS-XII of RV *Polarstern* in 1995; Report of Leg ANT-XII/3** [Die Expedition ANTARKTIS-XII mit *Polarstern* 1995; Bericht vom Fahrtabschnitt ANT-XII/3], *Berichte zur Polarforschung*, 1997, No.219, 188p., In German with English summary. Refs. p.166-169.

The leg ANT XII/3 sailed 11,000 nm from Cape Town to Punta Arenas, via the Weddell Sea with numerous stops along the way to provide logistic support to investigations at Drescher Inlet of Weddell seals feeding behavior and of the microorganic life directly below the sea ice. The major group of glaciologists and geophysicists was engaged in extensive programs of ice dynamics, and mass balance of the Filchner and Ronne Ice Shelves, collecting seismic, gravity, and tiltmeter data in addition to radar data. Two new ice cores were drilled atop Berkner Island to depths of 100m and 180m. Cores are expected to produce climatic data covering about 1,000 yrs. The aerogeophysical program based at Filchner Station provided support for grounding line data, ice thickness measurements, and magnetic data across Ronne Ice Sheet and Berkner I. CTD profiles of the Filchner/Ronne Ice Shelves and seismic mapping in this area were not completed due to ice conditions. Four automatic weather stations were deployed at Berkner and Filchner Stations and at the Grounding Line.

#### F-57513

Bindschadler, R., Bentley, C.R., **West antarctic ice sheet collapse**, *Science*, May 2, 1997, 276(5313), p.62-64, 10 refs.

The authors are in fairly close agreement as to the present condition of the West Antarctic Ice Sheet: it is not stable. Both also agree that there is now insufficient knowledge about the area in question to make an unequivocal statement regarding its collapse or non-collapse. RB is uneasy about CRB assuming a collapse "to be a random event, occurring once in a 100,000 years." CRB maintains that there is no evidence that a massive, order of magnitude increase in glacial outflow from Antarctica is likely to occur more often than once per 100,000 year glacial cycle. The only existing model relative to a hypothetical collapse cycle is pseudorandom. For the article being discussed, see 56690 or 51-2356.

#### F-57529

Frezzotti, M., **Twentieth century behavior of the ice fronts in Antarctica: environmental change evidence** [Fluttuazione delle fronti dei ghiacciai galleggianti durante il XX secolo in Antartide: evidenze di cambiamenti ambientali], *Geografia fisica e dinamica quaternaria*, 1995, 18(2), Cento Anni di Ricerca Glaciologica in Italia, Oct. 19-20, 1995. Convegno, p.271-275, In Italian with English summary. 33 refs.

A comparison of various documents, dated several years apart, has allowed the surficial ice discharge, the ice front fluctuation and the iceberg calving flux of Victoria Land coast during this century to be estimated. The Hells Gate and McMurdo Sound ice shelves and the floating glaciers of Cape Adare have undergone a significant retreat since the beginning of the 20th century. The different behavior of these floating glaciers with respect to others has been presumed to be due to increased energy available for meltwater production and to increased melting at the ice-ocean interface related to Circumpolar Deep Water. A first estimate of the mass balance of glaciers that fringe the Victoria Land coast shows a significantly positive value, despite all the uncertainties of balance measurements. (Auth.)

#### F-57530

Maggi, V., **Depth/density profiles and models from Northern Victoria Land shallow firn-cores (Antarctica)** [Profili di densità e modelli profondità/densità su carote di nevato prelevate in alcuni ghiacciai della Terra Vittoria Settentrionale (Antartide)], *Geografia fisica e dinamica quaternaria*, 1995, 18(2), Cento Anni di Ricerca Glaciologica in Italia, Oct. 19-20, 1995. Convegno, p.287-294, In Italian with English summary. 19 refs.

During the recent field seasons carried out by the Italian Antarctic Program (PNRA) 11 sites have been investigated to evaluate the annual accumulation rate in Northern Victoria Land. Fourteen shallow firn cores,

7.5 m to 21 m depth, have been drilled in different accumulation situations from the coast to the East Antarctic plateau margin, through the Transantarctic Mountains. Density profiles have been performed directly in the field and simple models have been calculated to evaluate the density gradients with depth. This work applies a simple depth/density model at 4 cores from different geographical situations. For the deeper part of the profiles, sintering processes have been involved in the increase of density. In this situation, the temperature of the ice crystals is an important factor in grain-to-grain matter transfer. For the future drilling activities, a simple depth-density model has been applied to these 4 firn cores to try to define the close-off depth. (Auth. mod.)

#### F-57540

Haas, C., **Sea ice thickness measurements using seismic and electromagnetic-inductive techniques** [Bestimmung der Meereisdicke mit seismischen und elektromagnetisch-induktiven Verfahren], *Berichte zur Polarforschung*, 1997, No.223, 161p., In German with English summary. Refs. p.151-158.

In this thesis, two geophysical methods, a seismic and an electromagnetic-inductive technique are examined for their accuracy and general applicability. Both aspects are investigated by means of comparisons of drill-hole determined with geophysically derived thicknesses along extended profiles. Additionally, the thickness range, resolution and sensitivity against variable ice properties are examined by means of theoretical model calculations. The porosity of the ice and its electrical conductivity are derived by means of ice core analyses. These are the main variables influencing the propagation of elastic waves and the development of electromagnetic fields in the ice. The bulk of the data in this report is gleaned from northern hemispheric ice sources. A near-closing section, p.127-145, presents measurements from the Bellingshausen and Amundsen Seas. (Auth. mod.)

#### F-57550

Rémy, F., Minster, J.F., **Antarctica ice sheet curvature and its relation with ice flow and boundary conditions**, *Geophysical research letters*, May 1, 1997, 24(9), p.1039-1042, 18 refs.

The map of the antarctic ice sheet surface curvature in the across-slope direction shows a very coherent pattern, related to ice flow anomalies of each flowline with respect to adjacent ones. Near the coast, these anomalies are correlated to bedrock features which suggests that they result from outlet flow conditions that are transmitted from coast to domes. As a consequence, they should represent the drainage pattern, glacier positions and 3-dimensional flowline directions. Thus a large part of the ice sheet flow pattern seems controlled by outflow boundary conditions which can be empirically estimated. (Auth.)

#### F-57556

Craig, S., Holmén, K., Björkström, A., **Net terrestrial carbon exchange from mass balance calculations: an uncertainty estimate**, *Tellus*, Apr. 1997, 49B(2), p.136-148, 34 refs.

One classical method of determining the net exchange of carbon between the atmosphere and the terrestrial biosphere is to perform a mass balance on atmospheric CO<sub>2</sub> over time. In this calculation, the residual flux needed to balance the carbon budget when fossil fuel emissions, ocean uptake, and the documented increase of atmospheric CO<sub>2</sub> concentrations are taken into account, is interpreted as being net terrestrial carbon exchange. In this study, the uncertainties in such a calculation are investigated and related to the magnitude of the "missing carbon sink" as a function of time. The difficulties in assigning a precise uncertainty estimate for the CO<sub>2</sub> growth rate from the antarctic ice core record are illustrated. It is then shown that the missing sink is significantly different from zero from the 1950s, to the present day, even when all the uncertainties are taken into consideration. Finally, it is pointed out that the uncertainties in the cumulative carbon budget imbalance may be larger than previously thought. (Auth. mod.)

#### F-57557

Comiso, J.C., Cavalieri, D.J., Parkinson, C.L., Gloersen, P., **Passive microwave algorithms for sea ice concentration: a comparison of two techniques**, *Remote sensing of environment*, June 1997, 60(3), p.357-384, 36 refs.



Two algorithms that have been used for deriving polar sea ice concentrations from multichannel data are compared. One is the NASA Team algorithm and the other is the Bootstrap algorithm, both of which were developed at NASA's Goddard Space Flight Center. The two algorithms use different channel combinations, reference brightness temperatures, weather filters, and techniques. To assess the difference in the performance of the two algorithms, analyses were performed with data from both hemispheres and for all seasons. The results show only small differences in the central Arctic in winter but larger disagreements in the seasonal regions and in summer. In some areas in the Antarctic, the Bootstrap technique shows ice concentrations higher than those of the Team algorithm by as much as 25%; whereas, in other areas, it shows ice concentrations lower by as much as 30%. The differences in the results are caused by temperature effects, emissivity effects, and tie point differences. The Team and the Bootstrap results were compared with available Landsat, advanced very high resolution radiometer and synthetic aperture radar data. All yield higher concentrations than the passive microwave algorithms. (Auth. mod.)

#### F-57605

Nicholls, K.W., **Predicted reduction in basal melt rates of an antarctic ice shelf in a warmer climate**, *Nature*, July 31, 1997, 388(6641), p.460-462, 16 refs.

Presented here are temperature measurements, from the Filchner/Ronne sub-ice-shelf cavity, which show a strong seasonality in the inflow of HSSW. This seasonality results from intense wintertime production of sea ice, and it is argued that the seasonal springtime warming can be used as an analogue for climate warming. For the present mode of oceanographic circulation, the implication is that warmer winters (a climate warming) leading to lower rates of sea-ice formation, would cause a reduction in the flux of HSSW beneath the ice shelf. The resultant cooling in the sub-ice cavity would lead, in turn, to a reduction in the total melting at the ice shelf's base. A moderate warming of the climate could thus lead to a basal thickening of the Filchner-Ronne Ice Shelf, perhaps increasing its longevity. (Auth. mod.)

#### F-57622

Jeffries, M.O., Adolphs, U., **Early winter ice and snow thickness distribution, ice structure and development of the western Ross Sea pack ice between the ice edge and the Ross Ice Shelf**, *Antarctic science*, June 1997, 9(2), p.188-200, Refs. p.199-200.

A study of early winter first-year sea ice conditions and development in the western Ross Sea in May and June 1995, showed strong spatial variability between the Ross Ice Shelf and the ice edge 1400 km to the north, and indicates that the development of the Ross Sea pack ice is quite different from that observed in other antarctic sea ice zones. The thinnest snow and ice occurred in a 200 km wide coastal zone. The thickest snow and ice were observed in a continental shelf zone 200-600 km from the coast. A zone of moderate snow and ice thickness occurred on the deep ocean from 600 km to the ice edge at 1400 km. Thermodynamic thickening of the ice in the inner pack ice, <800 km from the coast, was dominated by congelation ice growth, which occurred in a greater amount and in thicker layers than was observed in the outer pack ice >800 km from the coast and elsewhere in the antarctic pack ice. (Auth. mod.)

#### F-57656

Ivask, J., Pentchuk, J., **Analysis of ions in polar ice core samples by use of large injection volumes in ion chromatography**, *Journal of chromatography A*, May 16, 1997, 770(1-2), International Ion Chromatography Symposium, 9th, Reading, UK, Sep. 16-19, 1996. Proceedings, p.125-127, 7 refs.

In the present study a non-suppressed ion chromatography system with conductivity detection was tested in terms of sampling effects, the effects on the ion separation efficiency and analysis detection limits to find optimum conditions for the determination of chloride, nitrate, sulfate, sodium, ammonium, potassium, calcium and magnesium ions in polar ice core samples from Dome B, East Antarctica. (Auth. mod.)

#### F-57657

Kottmeier, C., Ackley, S.F., Andreas, E.L., **Wind, temperature and ice motion statistics in the Weddell Sea (a compilation**

**based on data from drifting buoys, vessels, and operational weather analyses)**, *World Meteorological Organization. Technical document*, Jan. 1997, WMO/TD-No.797, World Climate Research Programme (WCRP). International Programme for Antarctic Buoys (IPAB), 48p., 32 refs.

The data from sea ice buoys, which were deployed during the Winter Weddell Sea Project 1986, the Winter Weddell Gyre Studies 1989 and 1992, the Ice Station Weddell in 1992, the Antarctic Zone Flux Experiment in 1994, and several ship cruises in austral summers, are uniformly reanalyzed by the same objective methods. The buoys were capable of monitoring atmosphere pressure, air and ice temperatures, as well as position. The buoys were frequently arranged within groups of three to seven to allow calculation of reliable estimates of geostrophic winds and ice motion and under favorable conditions their spatial derivatives. Geostrophic winds for buoys operational regions are derived after matching of the buoy pressure data with the surface pressure fields of the European Centre for Medium Range Weather Forecasts. Historical data from drifting ships are included in the temperature, air pressure and ice drift analyses. This report documents the mean structure as well as the variability of ice motion and spatial derivatives of ice motion, the statistics of surface pressure, geostrophic winds and air temperatures in the sea ice covered part of the Weddell Sea. (Auth. mod.)

#### F-57705

Hogan, A.W., Gow, A.J., **Occurrence frequency of thickness of annual snow accumulation layers at South Pole**, *Journal of geophysical research*, June 27, 1997, 102(D12), p.14,021-14,027, 34 refs.

Analysis of 2,000 annual snow accumulation layers at the South Pole is applied to objective extraction of meteorological parameters from the Amundsen-Scott Station accumulation record. The authors have compared the 100-year "snow mine" accumulation record of Giovinetto and Schwerdtfeger and a 2000-layer pit and core record obtained in 1982. Frequency analysis of the number of occurrences of layers with respect to thickness or mass of the layer showed the logarithms of thickness or mass to be normally distributed. The snow accumulation and marine aerosol (sodium) accumulation in recent annual layers with the station meteorological record and the surface aerosol record may be transformable to provide an index of this meridional transport. It is proposed that the magnitude of snow accumulation, with respect to frequency of that accumulation, provides an objective criterion for comparing individual years of meteorological history and that the geometric standard deviation of accumulation provides an objective index for estimation of climatic fluctuation during the period of accumulation. (Auth. mod.)

#### F-57712

AMANDA Collaboration, **Optical properties of deep ice at the South Pole: absorption**, *Applied optics*, June 20, 1997, 36(18), p.4168-4180, 28 refs.

The authors discuss recent measurements of the wavelength-dependent absorption coefficients in deep South Pole ice. The method uses transit-time distributions of pulses from a variable-frequency laser sent between emitters and receivers embedded in the ice. At depths of 800-1000 m scattering is dominated by residual air bubbles, whereas absorption occurs both in ice itself and in insoluble impurities. The absorption coefficient increases approximately exponentially with wavelength in the measured interval 410-610 nm. At ca. 415 to ca. 500 nm the experimental uncertainties are small enough to resolve an extrinsic contribution to absorption in ice: submicrometer dust particles contribute by an amount that increases with depth and corresponds well with the expected increase seen near the Last Glacial Maximum in Vostok and Dome C ice cores. The laser pulse method allows remote mapping of gross structure in dust concentration as a function of depth in glacial ice. (Auth. mod.)

#### F-57713

Price, P.B., Bergström, L., **Optical properties of deep ice at the South Pole: scattering**, *Applied optics*, June 20, 1997, 36(18), p.4181-4194, 54 refs.

Recently, absorption and scattering at depths of 800-1000 m in South Pole ice have been studied with transit-time distributions of pulses from a variable-frequency laser sent between emitters and receivers embedded in the ice. At 800-1000 m, scattering is independent of wavelength and the



scattering centers are air bubbles of size  $\gg$  wavelength. At 1500-2000 m it is predicted that all bubbles will have transformed into air-hydrate clathrate crystals and that scattering occurs primarily at dust grains, at liquid acids concentrated along three-crystal boundaries, and at salt grains. Scattering from dust grains should show peaks at depths of ca. 1050, 1750 and 2200 m in South Pole ice. If marine salt grains remain undissolved, they will scatter like insoluble dust grains. Refraction at ice-ice boundaries and at hydrate-ice boundaries is manifested by a multitude of small-angle scatterers, independent of wavelength. The largest contribution to Rayleigh-like scattering is likely due to dislocations decorated discontinuously with impurities. (Auth. mod.)

#### F-57727

Abyzov, S.S., Bobin, N.E., Kudriashov, B.B., Lobyreva, L.B., Skvortsova, I.N., **Species composition and physiology of microorganisms in deep ice cores from Vostok Station** [O vidovom sostave i nekotorykh fiziologicheskikh osobennostiakh mikroorganizmov iz drevneishikh gorizontov lednika Tsentral'noi Antarktidi], *Antarktika*, 1995, No.33, p.172-175, In Russian with English summary. 17 refs.

Microbiological analysis of extremely deep ice cores from central Antarctica using a special aseptic sampling method shows that as the depth of the core increases, there is a gradual reduction in the number of viable microorganisms revealed when sown on nutrient media. In the most ancient levels of the glacier mainly sporofforming bacteria have been found. Some physiological peculiarities of the effect of modern pesticides and other chemicals on these sporofforming bacteria have been studied. (Auth. mod.)

#### F-57741

Petit, J.R., et al, **Four climate cycles in Vostok ice core**, *Nature*, May 22, 1997, 387(6631), p.359-360, 7 refs.

The Russian-American and French international effort for drilling in ice achieved both a technical and a scientific success by reaching a depth of 3,350 m at the Russian Vostok Station. In addition to being the deepest core, the Vostok core is now believed to cover the past four glacial-interglacial cycles (ca. 400,000 years), a surprisingly long climate sequence which will be a valuable tool for paleoclimatologists.

#### F-57750

Trupin, S.A., Panfili, R.P., **Mass balance of polar ice from long wavelength features of the Earth's gravitational field**, *Surveys in geophysics*, May 1997, 18(2-3), p.313-326, 31 refs.

Satellite solutions to the low degree zonal harmonics of the Earth's gravitational potential, and rates of surface accumulation are used to partially constrain, by means of repeated forward solution, the time rates of thickness change over the Antarctic and Greenland Ice Sheets. The sign of the slope of the low degree zonal coefficients versus sea level contribution for Greenland is positive, but for Antarctica the sign of the slope is positive for even degree and negative for odd degree harmonics. By using this property of the zonal coefficients, it is possible to determine the individual sea level contributions for Greenland and Antarctica. (Auth. mod.)

#### F-57751

Zwally, H.J., Giovinetto, M.B., **Annual sea level variability induced by changes in sea ice extent and accumulation on ice sheets: an assessment based on remotely sensed data**, *Surveys in geophysics*, May 1997, 18(2-3), p.327-340, 28 refs.

Changes of mean annual net accumulation at the surface on the grounded ice sheets of East Antarctica, West Antarctica and Greenland in response to variations in sea ice extent are estimated using grid-point values 100 km apart. The data bases are assembled principally by bilinear interpolation of remotely sensed brightness temperature, surface temperature, and surface elevation. Stepwise correlation analyses indicate that variations in sea ice extent of  $\pm 50$  km would lead to changes in accumulation inversely of  $\pm 4\%$  on East Antarctica,  $\pm 10\%$  on West Antarctica, and  $\pm 4\%$  on Greenland. These results substantiate the findings for the antarctic ice sheets and suggest a reduction by one half of the probable change of accumulation on Greenland. (Auth. mod.)

#### F-57775

Conrad, C.P., Hager, B.H., **Spatial variations in the rate of sea level rise caused by the present-day melting of glaciers and ice sheets**, *Geophysical research letters*, June 15, 1997, 24(12), p.1503-1506, 14 refs.

The redistribution of surface water mass associated with the melting of glacial ice in both the Arctic and Antarctic causes uplift near areas of mass depletion, depression of the seafloors, and changes in the earth's gravitational field which perturb the ocean surface. As a result, local spatial variations exist in the rate of sea level rise. Because most long duration tide gauges are in the Northern Hemisphere, if the sources of sea level rise are unbalanced between the two hemispheres, estimates of global sea level rise could be in error by 10 to 20%. Individual tide gauges could be more seriously unrepresentative if they are near regions of significant present-day mass depletion. (Auth. mod.)

#### F-57782

Anandakrishnan, S., Alley, R.B., **Tidal forcing of basal seismicity of ice stream C, West Antarctica, observed far inland**, *Journal of geophysical research*, July 10, 1997, 102(B7), p.15,183-15,196, 51 refs.

The seismicity rate beneath the downglacier 85 km of ice stream C, West Antarctica, is modulated by the tide. The tide beneath the Ross Ice Shelf modifies the force balance of the ice stream basal environment enough to change the rate of basal microearthquake generation by an order of magnitude. This tidal forcing travels up the ice stream as an attenuating wave at approximately 1.6 m/s and is detectable 85 km from the grounding line. The authors successfully model this behavior as an elastic ice stream underlain by a viscous substrate of viscosity  $\eta$  and thickness  $h_b$  and calculate that the substrate has an apparent stiffness  $\eta/h_b$  of  $O(10^8)$  Pa s/m. This finding suggests that the conditions of the till layer at the bed of ice stream C are similar to those of ice stream B and that the reason for the recent stagnation of ice stream C is other than loss of till. It is further found that the ice stream at the grounding line is more strongly affected by ice shelf processes than by the basal shear stress. (Auth.)

#### F-57796

Thompson, S.L., Pollard, D., **Greenland and antarctic mass balances for present and doubled atmospheric CO<sub>2</sub> from the GENESIS Version-2 global climate model**, *Journal of climate*, May 1997, 10(5), p.871-900, Refs. p.898-900.

There are two significant problems in using general circulation models (GCMs) to predict mass balance distributions on ice sheets: the relatively coarse GCM horizontal resolution truncates the topography of the ice-sheet flanks and smaller ice sheets such as Greenland; and the snow and ice physics in most GCMs does not include ice-sheet-specific processes such as the refreezing of meltwater. This GCM is well suited for ice-sheet mass-balance studies because (a) the surface can be represented at a finer resolution than the atmospheric GCM, (b) the two correction techniques are included as part of the model, and (c) the model's mass balances for present-day Greenland and Antarctica are realistic. (Auth. mod.)

#### F-57801

Lintinen, P., **Evidence for the former existence of a thicker ice sheet on the Vestfjella nunataks in western Dronning Maud Land, Antarctica**, *Geological Society of Finland. Bulletin*, 1996, 68(pt.1), p.85-98, Refs. p.97-98.

A 130 km long nunatak range in western Queen Maud Land, the Kraul Mountains, whose northern and southern ends are situated close to the present ice sheet grounding-line were studied. Striations and lodgement till on nunatak Basen indicate that the northernmost nunataks were formerly covered by a thicker antarctic ice sheet. Striations on the summit ridge of nunatak Plogen indicate that the minimum change in ice thickness has been 700 m at the present ice sheet grounding-line. The relatively uniform oldest striation direction on different nunatak summits and the altitude of Plogen, which is less than 200 m lower than the highest summits, indicates that the whole range may have been covered by an ice sheet. Age determinations and sedimentological data obtained from Weddell Sea sediments by Norwegian researchers suggest that a grounded ice sheet extended to the shelf edge at around 21 ka B.P. (Auth. mod.)



**F-57840**

Corbera, J., Granada, F., Ballester, N., Calvet, J., **Evaluation of the ice cap fluctuations on Livingston I., 1956-1991, from satellite images of Moon Bay** [Evaluación de las fluctuaciones del casquete glaciar en la zona de Bahía Moon - Isla Livingston, entre 1956 y 1991, a partir del cálculo de parámetros estructurales y texturales en fotografías aéreas e imágenes de satélite], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.243-257, In Spanish with English summary. 7 refs.

To determine ice cover oscillations on Livingston I., an evaluation was made of textural and structural parameters in Moon Bay. Five conventional texture parameters (uniformity, inertia, entropy, inverse different moment, maximum probability) were calculated from Landsat images. Laplacian images were elaborated to study the distribution and shapes of crevasses, and aerial photographs were used for ice cliff profiles and the determination of geomorphological processes. The relationship between those parameters and the fluctuations of the ice cap is discussed. (Auth. mod.)

**F-57841**

Ballester, N., Granada, F., Corbera, J., Calvet, J., **Ice cap fluctuation on Greenwich I., 1956-1991** [Fluctuaciones del casquete glaciar de la Isla Greenwich (Shetlands del Sur) en el período 1956-1991], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.259-264, In Spanish with English summary. 4 refs.

This paper presents the results of monitoring of the ice cap fluctuations on Greenwich I. from aerial photographs taken in 1956-57, and satellite images taken in 1986 (Landsat-4.MSS), 1988 (Landsat-5.TM), 1989 (Landsat-5.TM) and 1991 (panchromatic SPOT). A very significant retreat has been observed between 1956 and 1991, close to 4% of the ice cap surface, although a few advances were noted during 1988-89. (Auth. mod.)

**F-57842**

Casas, J.M., Calvet, J., Pallàs, R., Santanach, P., Vilaplana, J.M., **Fold formation in glacier lobes on Hurd Peninsula** [Formación de pliegues en lóbulos de glaciares de casquete. Ejemplos del glaciar de la Península Hurd (Isla Livingston)], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.265-277, In Spanish with English summary. 14 refs.

The Hurd glacier covers the eastern part of Livingston I.; interlayered dark pyroclastic rocks delineate the bedding and constitute a characteristic feature. A 3-D glacier pattern was obtained from mapping of the bedding on the glacier snow-free surface, together with the glacier cliff and crevasse outcrops. The structure of two different lobes, the BAE and Johnson lobes, shows bedding, cleavage, thrusts, unconformities and detachment planes. In both lobes, folds are the most striking feature; they deform the bedding and are related to planar structures. Folds range from few centimeters to hundreds of meters in size, from open to tight or isoclinal, generally asymmetric and recumbent. Fold axis ranges from oblique to parallel to ice flow direction. Axial surfaces vary from subhorizontal, near the base of the glacier, to step-dipping or subvertical on the surface. Fold location also varies from the margin (BAE lobe) to the center (Johnson lobe) of the glacier. (Auth. mod.)

**F-57843**

Vilaplana, J.M., Pallàs, R., **Snow cover characteristics and evolution on Livingston I.** [Características y evolución del manto nivoso en Isla Livingston], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.279-290, In

Spanish with English summary. 16 refs.

Observations and measurements obtained from 6 snow pits on Hurd Peninsula showed the following: along all the profiles, snow layers consisted of large grounded grains, with several layers of interstratified ice crusts; the mean snow density value was  $0.5 \text{ gr/cm}^3$ , and the temperature was always higher than  $0.7^\circ\text{C}$ . The ice crusts corresponded to periods in which temperatures were above  $0^\circ\text{C}$ ; during the winter of 1991-1992, several periods of high temperatures occurred. Data analysis allowed to establish the snow equilibrium line at about 235 m above sea level. Wind effects on Livingston I. snow fields, observed and measured at 4 different locations, show snow drifts and erosive structures generated by ENE winds. (Auth. mod.)

**F-57873**

Morgan, V.O., Wookey, C.W., Li, J., Van Ommen, T.D., Skinner, W., Fitzpatrick, M.F., **Site information and initial results from deep ice drilling on Law Dome, Antarctica**, *Journal of glaciology*, 1997, 43(143), p.3-10, 39 refs.

The aim of deep ice drilling on Law Dome has been to exploit the special characteristics of Law Dome summit, i.e. low temperature and high accumulation near an ice divide, to obtain a high-resolution ice core for climatic/environmental studies of the Holocene and the Last Glacial Maximum (LGM). Drilling was completed in Feb. 1993. The LGM/Holocene  $\delta^{18}\text{O}$  shift of 7.0 per mill, only ca. 1 per mill larger than for Vostok, indicates that Law Dome remained an independent ice cap and was not over-ridden by the inland ice sheet in the Glacial. (Auth. mod.)

**F-57874**

Jenkins, A., Vaughan, D.G., Jacobs, S.S., Hellmer, H.H., Keys, J.R., **Glaciological and oceanographic evidence of high melt rates beneath Pine Island Glacier, West Antarctica**, *Journal of glaciology*, 1997, 43(143), p.114-121, 22 refs.

Satellite imagery indicates that the floating terminus of Pine Island Glacier has changed little in extent over the past two decades. Data on the velocity and thickness of the glacier reveal that calving accounts for only half of the ice input near the grounding line. The apparently steady configuration implies that the remainder of the input is lost by basal melting. Ocean circulation in Pine Island Bay transport  $+1^\circ\text{C}$  waters beneath the glacier and temperatures recorded in melt-laden outflows show that heat loss from the ocean is consistent with the requirements of the calculated melt rate. The combination of iceberg calving and basal melting lies at the lower end of estimates for the total accumulation over the catchment basin, drawing into question previous estimates of a significantly positive mass budget for this part of the ice sheet. (Auth. mod.)

**F-57875**

Wendler, G., Adolphs, U., Hauser, A., Moore, B., **On the surface energy budget of sea ice**, *Journal of glaciology*, 1997, 43(143), p.122-130, 27 refs.

The surface energy budget was investigated during a cruise through the pack ice in the southern ocean. The time of observation was close to mid-summer. Some of the more important findings were: the mean albedo varied from 11% for open water to 59% for 10/10 ice cover, hourly values span the range from 6% (open water) to 76% (total ice cover); the net heat flux into the ocean was on average  $109 \text{ W/m}^2$ , if this energy were used solely for melting of sea ice, 30 mm could be melted each day; and for low surface albedos, the net radiation increased with decreasing cloudiness, however, the opposite was the case for a high surface albedo. The last point shows the importance of clouds on the surface energy budget. Not only should their presence or absence be known but also the reflectivity of the underlying surface, as it might change the net radiation in opposite ways. (Auth. mod.)

**F-57876**

Jeffries, M.O., Worby, A.P., Morris, K., Weeks, W.F., **Seasonal variations in the properties and structural composition of sea ice and snow cover in the Bellingshausen and Amundsen seas, Antarctica**, *Journal of glaciology*, 1997, 43(143), p.138-151, 39 refs.

Sixty-three ice cores were collected in the Bellingshausen and Amundsen seas in Aug. and Sep. 1993 during a cruise of the R.V. *Nathaniel B. Palmer*. The structure and stable-isotopic composition of the



cores were investigated in order to understand the growth conditions and to identify the key growth processes, particularly the contribution of snow to sea-ice formation. The structure and isotopic composition of a set of 12 cores that was collected for the same purpose in the Bellingshausen Sea in Mar. 1992 are reassessed. Frazil ice and congelation ice contribute 44% and 26%, respectively, to the composition of both the winter and summer ice-core sets. The accumulation of superimposed ice is evidence that melting in the snow cover on antarctic sea-ice floes can reach an advanced stage and contribute a significant amount of snow to the total ice mass. (Auth. mod.)

#### F-57877

Morris, E.M., Bader, H.P., Weilenmann, P., **Modelling temperature variations in polar snow using DAISY**, *Journal of glaciology*, 1997, 43(143), p.180-191, 31 refs.

A physics-based snow model has been calibrated using data collected at Halley Bay during the International Geophysical Year. Variations in snow temperature and density are well-simulated using values for the model parameters within the range reported from other polar field experiments. The effect of uncertainty in the parameter values on the accuracy of the predictions is no greater than the effect of instrumental error in the input data. Thus, this model can be used with parameters determined a priori rather than by optimization. The model has been validated using an independent data set from Halley Bay and then used to estimate 10 m temperatures on the Antarctic Peninsula plateau over the last half-century. (Auth.)

#### F-57882

Cole-Dai, J., Mosley-Thompson, E., Thompson, L.G., **Annually resolved Southern Hemisphere volcanic history from two antarctic ice cores**, *Journal of geophysical research*, July 27, 1997, 102(D14), p.16,761-16,771, 44 refs.

The continuous sulfate analysis of two antarctic ice cores, one from the Antarctic Peninsula region and one from West Antarctica, provides an annually resolved proxy history of Southern Hemisphere volcanism since early in the 15th century. The dating is accurate within  $\pm 3$  years due to the high rate of snow accumulation at both core sites and the small sample sizes used for analysis. The two sulfate records are consistent with each other. A systematic and objective method of separating outstanding sulfate events from the background sulfate flux is proposed and used to identify all volcanic signals. A technique for comparing the magnitude of volcanic events preserved within different ice cores is developed using normalized sulfate flux. (Auth. mod.)

#### F-57887

Azuma, N., et al, **Glaciological data collected by the 36th Japanese Antarctic Research Expedition during 1995-1996**, *Japanese Antarctic Research Expedition. JARE data reports*, Mar. 1997, No.223, 83p., Refs. passim.

This report presents an outline of field observations carried out by JARE-36 in 1995-1996. Data on snow accumulation, density and temperature, and surface meteorological data collected during oversnow traverses, are discussed and presented in tables.

#### F-57900

Satake, H., Kawada, K., **Quantitative evaluation of sublimation and the estimation of original hydrogen and oxygen isotope ratios of a firn core at east Queen Maud Land, Antarctica**, *Bulletin of glacier research*, July 1997, No.15, p.93-97, 19 refs.

The quantitative evaluation of sublimation during firnification and the estimation of original hydrogen and oxygen isotope ratios of deposited snow were attempted by a simultaneous measurement of  $\delta D$  and  $\delta^{18}O$  values in a firn core having well-developed depth hoar collected at east Queen Maud Land. The d-parameter of the core ranged from 11 to 18 and showed good positive correlation with the depth hoar level suggesting that the increase in the d-parameter from 10 was caused by post-depositional firnification in which sublimation plays an important role. Based on the d-parameters, the firn was estimated to have lost 30-35% of deposited snow during firnification and to be enriched in deuterium and oxygen-18 by about 50 and 6 per mill, respectively, relative to the deposited snow. (Auth.)

#### F-57903

De la Mare, W.K., **Abrupt mid-twentieth-century decline in antarctic sea-ice extent from whaling records**, *Nature*, Sep. 4, 1997, 389(6646), p.57-60, 16 refs.

A decline in antarctic sea-ice extent is a commonly predicted effect of a warming climate. Direct global estimates of the antarctic sea-ice cover from satellite observations have shown no clear trends. A significant data source has, however, been overlooked. The southern limit of whaling was constrained by sea ice, and since 1931 whaling records have been collected for every whale caught, giving a circumpolar coverage from spring to autumn until 1987. An analysis of these catch records indicates that, averaged over Oct. to Apr. the antarctic summer sea-ice edge has moved southwards by  $2.8^\circ$  of latitude between the mid 1950s and early 1970s. This suggests a decline in the area covered by sea ice of some 25%. This abrupt change poses a challenge to model simulations of recent climate change, and could imply changes in antarctic deep-water formation and in biological productivity, both important processes affecting atmospheric  $CO_2$  concentrations. (Auth. mod.)

#### F-57917

Drinkwater, M.R., Lytle, V.I., **ERS 1 radar and field-observed characteristics of autumn freeze-up in the Weddell Sea**, *Journal of geophysical research*, June 15, 1997, 102(C6), p.12,593-12,608, 42 refs.

ERS 1 satellite microwave radar data are analyzed to investigate changes in sea ice characteristics during a period when a drifting ice camp was deployed in the Weddell Sea. Synthetic aperture radar and scatterometer data are calibrated and geolocated to derive a time series of C band backscatter coefficient corresponding with simultaneous surface measurements during the austral autumn freeze-up. Thermistor strings were implanted in the snow and ice at a number of local and regional sites. Results show that the microwave radar backscatter characteristics of this perennial ice region responded sensitively to changes in air temperature and corresponding changes in turbulent flux of heat at the surface of the sea ice. The backscatter coefficient time series measured by each radar indicated that backscatter coefficient fell by several decibels during the freezing and transformation of the layer of saturated, saline basal snow into snow ice. These results suggest the possibility of monitoring the timing and autumn freeze-up transition of regional ice signatures as a means of quantifying the proportion of flooded perennial sea ice. (Auth. mod.)

#### F-57918

Fichefet, T., Morales Maqueda, M.A., **Sensitivity of a global sea ice model to the treatment of ice thermodynamics and dynamics**, *Journal of geophysical research*, June 15, 1997, 102(C6), p.12,609-12,646, Refs. p.12,644-12,646.

The sensitivity of a global thermodynamic-dynamic sea ice model coupled to a one-dimensional upper ocean model to degradations of the model physics is investigated. The thermodynamic component of the sea ice model takes into consideration the presence of snow on top of sea ice, the storage of sensible and latent heat inside the snow-ice system, the influence of the subgrid-scale snow and ice thickness distributions on sea ice thermodynamics, the transformation of snow into snow ice when snow depth increases to the point where the snow-ice interface sinks below the waterline, and the existence of leads and polynyas (areas of open water) within the ice cover. It is very important to note that a single set of parameter values is employed to simultaneously simulate the arctic and antarctic ice regimes. A total of 9 sensitivity experiments show that the thermal inertia of the snow-ice system is negligible in the Antarctic but not in the Arctic. Results suggest that the thermodynamic effect of the subgrid-scale snow and ice thickness distributions, the existence of open water areas within the ice cover, and the ice motion play a crucial role in determining the seasonal behavior of both ice packs. (Auth. mod.)

#### F-57965

Legrand, M., Mayewski, P., **Glaciochemistry of polar ice cores: a review**, *Reviews of geophysics*, Aug. 1997, 35(3), p.219-243, Refs. p.240-243.

This paper deals with the chemistry of polar ice focused on the soluble mineral and organic species and their interpretation in terms of past atmospheric composition. The authors discuss ice core dating, the difficulties connected with trace measurements, the significance of the ionic composi-



tion of snow, examine temporal and spatial variations in the ionic budget of the precipitation; and evaluate ice core studies in terms of the chemical composition of the past atmosphere. They review how Greenland and antarctic ice cores that span the last few centuries have provided information on the impact of human activities and how the chemistry of deep ice cores provides information on various past natural phenomena such as climatic variations. (Auth. mod.)

#### F-57982

Damm, V., **Subice morphology deduced by radio echo soundings (RES) in the area between David and Mawson Glaciers, Victoria Land**, *Geologisches Jahrbuch. Reihe B*, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.321-331, With German and Russian summaries. 8 refs.

Ice thicknesses in the area between David and Mawson Glaciers were measured by radio echo sounding (RES) during GANOVEX VII (1992-93) and the 9th Italian Antarctic Expedition (1993-94). The aim of these measurements was twofold: to obtain a map of the ice thicknesses and sub-ice topography in the region for the ice thickness correction of gravity data; and to determine the subice relief along the ACRUP-1 seismic profile (Antarctic Crustal Profile 1). Details of this exploration and data collection by RES equipment are provided and discussed: the extent of the surveys, sub-ice morphology and topography, and the area of greatest ice thickness. (Auth. mod.)

#### F-57991

Stroeven, A.P., Prentice, M.L., **Case for Sirius Group alpine glaciation at Mount Fleming, South Victoria Land, Antarctica: a case against Pliocene East Antarctic Ice Sheet reduction**, *Geological Society of America. Bulletin*, July 1997, 109(7), p.825-840, Refs. p.838-840.

On the premise that the Sirius Group tills and the marine diatoms were deposited by the East Antarctic Ice Sheet, and that the East Antarctic Ice Sheet was much reduced in area and volume during the Pliocene, the Sirius Group lodgment tills on Mount Fleming, in the Dry Valleys sector of the Transantarctic Mountains, were studied. Results suggests that the Sirius Group lodgment tills at Mount Fleming do not support the hypothesis that the East Antarctic Ice Sheet was much reduced during the Pliocene, and demonstrate that Sirius Group lodgment tills on Mount Fleming were deposited by alpine ice. (Auth. mod.)

#### F-57992

Waechter, B.F., Sinclair, R.J., Schuyler, G.D., Williams, C.J., **Snowdrift control design: application of CFD simulation techniques**, International Conference on Snow Engineering, 3rd, Sendai, Japan, May 26-31, 1996 Proceedings. Snow engineering: recent advances. Edited by M. Izumi, T. Nakamura, and R.L. Sack, Rotterdam, A.A. Balkema, 1997, p.511-516, 10 refs.

Computer modelling techniques, employing computational fluid dynamics (CFD) and a finite area element model (FAE), were used to predict snowdrift deposition patterns around a new building at the Amundsen-Scott Station. Through interpretation of the wind flow field predicted through CFD, snowdrift prone areas around an existing building, that is raised above the snow surface, were identified. The wind flow field, generated by CFD, was subsequently used as input to an FAE computer snowdrift prediction model. The characteristics of the drift deposition patterns predicted by the computer simulation techniques were in satisfactory agreement with snowdrift patterns measured around the existing reference building at the Station. It is concluded that the FAE model predicts realistic snowdrift accumulation patterns when CFD-predicted local wind velocity fields are combined with local meteorological data. (Auth.)

#### F-57999

Emery, W.J., Fowler, C.W., Maslanik, J.A., **Satellite-derived maps of arctic and antarctic sea ice motion: 1988 to 1994**, *Geophysical research letters*, Apr. 15, 1997, 24(8), p.897-900, 24 refs.

Standard image processing methods applied to Special Sensor Microwave/Imager data provide previously unseen details about sea ice motion in the Arctic and southern oceans. Means calculated from daily ice

motions for 1988-1994 confirm the basic circulation patterns established from drifting stations and buoys. In the Antarctic, the gridded motion fields show a nearly continuous westward transport along the antarctic coast, with well-defined regions of exchange between this East Wind Drift and the Antarctic Circumpolar Current. This detailed view of mean ice motion in the southern ocean is unique and presents a comprehensive overview not previously available for antarctic ice motions. (Auth. mod.)

#### F-58006

Nakagawa, K., **Albedo distribution in Lützow-Holm Bay and its neighborhood**, *Antarctic record*, Mar. 1997, 41(1), p.63-71, In Japanese with English summary. 15 refs.

A method has been developed for estimating the filtered narrow band surface albedo with NOAA/AVHRR data, and has been applied to analysis of the surface albedo distribution in Lützow-Holm Bay and vicinity in 1990. Sixteen maps of the surface albedo distribution have been drawn. A comparison of the albedos inferred from satellite data with those actually observed in Ongul Strait shows that the satellite-inferred, filtered narrow band albedos agree with the daily means of ground-observed, unfiltered broad band albedo. There is a characteristic pattern of surface albedo distribution in this area: the open sea albedo is less than 5%, whereas most of the compact pack ice and fast ice albedo is more than 60%. The albedo is lowest in the eastern part of Lützow-Holm Bay; off the Sôya Coast it is less than 40%. The ice sheet of Antarctica has the remarkably high albedo of more than 80%. (Auth. mod.)

#### F-58024

Ushio, S., Takizawa, T., Ohshima, K.I., Kawamura, T., **Ice production and convective mixing in the coastal polynya off Lützow-Holm Bay, Antarctica**, *Antarctic record*, Mar. 1997, 41(1), p.329-334, In Japanese with English summary. 5 refs.

A coastal polynya often forms around Lützow-Holm Bay, even in severe winter. To clarify the characteristics of oceanic structure in the polynya, the water mass of the convective-mixed layer was analyzed. Haline convection by the high ice production in the winter polynya contributes to the formation of a thicker mixed layer than that in the pack ice region. Furthermore, the active convection leads to entrainment of the oxygen-poor deep water underlying the winter mixed layer. Consequently, in the polynya located over the continental shelf break, the oxygen content of the mixed layer is somewhat lower than that in the other polynya, Breid Bay, where haline convection reaches only to the shallow sea bottom of the continental shelf. (Auth.)

#### F-58025

Takizawa, T., Ohshima, K.I., Ushio, S., Kawamura, T., Enomoto, H., **Temperature structure and SSM/I images of the Cosmonaut polynya region**, *Antarctic record*, Mar. 1997, 41(1), p.335-346, In Japanese with English summary. 4 refs.

Analysis of the water temperature structure in the Indian Ocean between 60-68°S, 35-65°E in 1987-1992, shows that water with temperature below -1.5°C was present in the antarctic coastal region. The Circumpolar Deep Water, with temperature higher than 1.0°C, was found at about 150 m depth, from northeast to northwest, of the cold water area. The SSM/I images in 1987-1991 indicate that polynya activity was intense in 1988. Due to weak activity, small and sporadic polynyas formed in 1987, 1989, 1990 and 1991. It is considered that the atmospheric convergence line and the Antarctic Divergence region are responsible for polynya activity in the southern Indian Ocean. (Auth. mod.)

#### F-58026

Miyakawa, T., Ohshima, K.I., **Sea ice drift off Queen Maud Land, Antarctica**, *Antarctic record*, Mar. 1997, 41(1), p.347-354, In Japanese with English summary. 7 refs.

Characteristics of sea ice drift off Queen Maud Land are described based on data from a buoy deployed in the pack ice region off Showa Station on Feb. 20, 1992. The drift of the buoy is consistently westward, with some variability. Averaged velocity of the drift is about 20 cm/s in the area from 39°E (Feb. 20) to 14°E (Apr. 10). The drift velocity becomes especially high west of the Riiser-Larsen Peninsula. Drift vectors of sea ice off Queen Maud Land are obtained from 68 NOAA/AVHRR images. In general, the drift vectors follow the bottom contours: they are mostly west-



ward in the coastal region and northward in the east of Gunnerus Ridge. Both the buoy and AVHRR analyses suggest that the sea ice drift is influenced considerably by the ocean currents. (Auth.)

#### F-58027

Shimoda, H., et al, **Observations of sea-ice conditions in the antarctic coastal region using ship-board video cameras**, *Antarctic record*, Mar. 1997, 41(1), p.355-365, In Japanese with English summary. 5 refs.

During the JARE-30, JARE-31, and JARE-32 sea-ice conditions were recorded by video camera on board the *Shirase*. The sea-ice images were used to estimate compactness and thickness quantitatively. Analyzed areas are those from Breid Bay to Showa Station. The results show yearly variations of ice compactness and thickness, latitudinal variations of thickness, and differences in thickness histograms between JARE-30 and JARE-32 in Lützow-Holm Bay. Albedo values were measured simultaneously by a short-wave radiometer. These values are proportional to those of ice compactness. The relationship between ice compactness and vertical gradient of air temperature above sea ice is discussed. (Auth. mod.)

#### F-58028

Kawamura, T., Takizawa, T., Ohshima, K.I., Ushio, S., **Characteristics and growth processes of sea ice in Lützow-Holm Bay**, *Antarctic record*, Mar. 1997, 41(1), p.367-383, In Japanese with English summary. Refs. p.381-383.

Observations of multiyear sea ice were made in Lützow-Holm Bay in 1990-91 to determine the snow and ice characteristics and ice growth processes. The snow depth in the Bay reached the remarkably high values of 1.0 to 1.5 m during winter. Fast ice with deep snow cover showed little growth during winter, but it thickened substantially during the summer months. Based on ice core structure, salinity and stable isotopic composition, it is concluded that the ice grows upward, caused by snow and superimposed ice formation; evidence of snow cover melting, which is a prerequisite for superimposed ice formation, was found. The summer upward-growth was not found in sea ice with low snow accumulation. Snow cover, therefore, significantly affects the growth processes and structure of sea ice. (Auth. mod.)

#### F-58030

Kawamura, T., Takizawa, T., Ohshima, K.I., Ushio, S., **Ocean and sea-ice observations during the Antarctic Climate Research program**, *Antarctic record*, Mar. 1997, 41(1), p.395-414, In Japanese with English summary. 6 refs.

Air-ice-sea interaction studies were conducted in Ongul Sound and the Lützow-Holm Bay in 1990-92. Measurements were carried out in order to reveal the flow and oceanic structure under the fast ice. Current meters and thermistor chains were also moored to collect long-term data. Sea ice cores were sampled and analyzed to determine the structure and growth processes. In this report, the authors describe oceanographic observations in detail, as well as the structure and development of sea ice at points across the Ongul Sound, and ice growth processes in an artificial pool in the Sound. (Auth. mod.)

#### F-58032

Takahashi, S., **Bare ice fields developed in the inland part of the antarctic ice sheet**, *Antarctic record*, Mar. 1997, 41(1), p.433-445, In Japanese with English summary. 10 refs.

Observations of bare ice fields were carried out at Seal Rock in the Sør Rondane Mountains. A higher sublimation rate, 200 to 280 mm/a, was noted. Air temperature on the bare ice was about 1°C higher than that on the snow surface. The higher sublimation rate is attributed to the low albedo of the bare ice; its value is roughly estimated from the heat budget data. The bare ice fields are classified into 4 types according to origin. (Auth. mod.)

#### F-58034

Motoyama, H., Azuma, N., Fujita, S., **Glaciological studies near the Sør Rondane Mountains, East Antarctica**, *Antarctic record*, Mar. 1997, 41(1), p.459-466, In Japanese with English summary. 5 refs.

In order to study the influence of the Sør Rondane Mountains on the stability of the antarctic ice sheet, the following activities were carried out in 1988 and 1989: a series of shallow drillings along a selected flow line upstream of the Sør Rondane Mountains to Breid Bay; surface flow velocity, strain and mass balance measurements on the flow line; and monitoring of a valley glacier in the Sør Rondane Mountains. Results are discussed and presented in tables and charts. (Auth. mod.)

#### F-58056

Frankenstein, S., **Effects of waves on pancake ice**, Potsdam, NY, Clarkson University, 1996, 244p., University Microfilms order No. 9700878, Ph.D. thesis. Refs. p.241-244.

This thesis investigates both experimentally and analytically the interaction in the Weddell Sea between waves and pancake ice, including floe drift and floe-floe collisions. It is found that a floe's initial velocity, but not its oscillation amplitude, is dependent on the starting conditions. Both parameters appear to be independent of the floe thickness and concentration. Fractal dimension calculations reveal that two first-order differential equations are needed to describe the floe motion. Even though the thinner floes are observed to collide more often than the thicker floes, they do not remain in contact longer. For refrigerated tests lasting longer than twenty minutes the ice concentration governs both the floe motion and the collision characteristics. This is due to the continuous production of frazil at the beach. (Auth. mod.)

#### F-58065

Krebs, K.A., Mabin, M.C.G., **Distribution, activity and characteristics of the alpine-type glaciers of northern Prince Charles Mountains, East Antarctica**, *Antarctic science*, Sep. 1997, 9(3), p.307-312, 8 refs.

In the northern Prince Charles Mountains, a total of 47 glaciers have been investigated using maps and aerial photographs, and in the summer of 1991-92 17 of these were examined in the field. Their distribution and their present-day snowline altitudes appear to be influenced by their location with respect to snow-bearing winds, particularly the summer winds that bring moisture from the open waters of Prydz Bay. Moraine morphologies indicate that these glaciers advance and retreat out-of-phase with the larger ice sheet outlet glaciers. During the last glacial maximum the alpine-type glaciers retreated while the ice sheet outlet glaciers showed a minor expansion. This is believed to be due to the alpine-type glaciers being starved of snowfall as the expanded last glacial maximum sea-ice cover around the continent would have removed their maritime moisture sources. Recent contrasts in the behavior of the alpine glaciers may reflect changes in summer sea ice extent in Prydz Bay. (Auth.)

#### F-58068

Augustinus, P.C., Gore, D.B., Leishman, M.R., Zwart, D., Colhoun, E.A., **Reconstruction of ice flow across the Bunger Hills, East Antarctica**, *Antarctic science*, Sep. 1997, 9(3), p.347-354, 28 refs.

In the Bunger Hills, mapping of the glacial drift sheets and examination of striae patterns and other palaeo-ice flow direction indicators show that the largely ice-free region records the imprint of ice sheet expansion(s) during the Late Cenozoic. In particular, ice moulded features and striae in southern Bunger Hills suggest formation during at least two episodes of ice sheet expansion. The older event relates to thin ice with flow constrained by the topography, whilst the younger event relates to regional expansion of thick ice across the area. Discrimination of the order of emplacement of the cross-cutting striae patterns is possible at a number of sites. Palaeo-ice flow indicators confirm that ice sheet expansion over southern Bunger Hills was purely from the southern and eastern margins, although minor advances of the northeast flowing Edisto Glacier onto coastal areas occurred following retreat of the last extensive ice sheet phase. (Auth. mod.)

#### F-58072

Rosenberger, A., Oerter, H., Miller, H., **Short range radar observations on Ekströmisén, Antarctica**, *Polarforschung*, 1995 (Pub. 1997), 65(1), p.1-14, With German summary. 9 refs.

A new digital impulse radar, designed at Alfred Wegener Institute, has undergone a first field-test on the Ekström Ice Shelf. Due to a special dynamic compression scheme, the instrument has excellent short range



capabilities and the resolution is better than one meter. Several profiles were acquired during the tests in the summer season 1992-1993 from which examples are given. The longest profile covers 60 km starting from Halvfarryggen down to the central part of the Ekström Ice Shelf and continues north towards the Georg von Neumayer Station. Although the data quality of the long range record suffered from electromagnetic compatibility problems, which could not be immediately remedied in the field, the short range records show detailed structure which may give some insight into the flow kinematics of the Ekström Ice Shelf. (Auth. mod.)

#### F-58073

Lambrecht, A., Mayer, C., Hempel, L., Nixdorf, U., Oerter, H., **Glaciological investigations in the grounding line area of the Foundation Ice Stream, Antarctica**, *Polarforschung*, 1995 (Pub. 1997), 65(1), p.15-25, With German summary. For another version see F-57151 or 51-3477. Refs. p. 24-25.

During the summer of 1994-95, an extensive program of glaciological, geophysical and geodetic measurements was carried out along a flow line of the Foundation Ice Stream. The collected data are the basis for mass flux determinations in the entrainment area of the ice stream into the Ronne Ice Shelf. In this paper, the collected data and first results are presented, including information about ice thickness, water column thickness and the uppermost layered sea bed in the grounding line area of the Foundation Ice Stream. In addition, airborne radio echo soundings (RES) were conducted over the southeastern part of the Ronne Ice Shelf gaining more widespread information about the ice thickness. The data derived from these different methods agree well. The radio echo sounding data indicate a position of the grounding line, which is some 40 km further south than expected. Therefore, the area of the Filchner-Ronne Ice Shelf is about 1700 km<sup>2</sup> larger than was previously thought. (Auth. mod.)

#### F-58097

Wang, Z.P., Dieckmann, G., Gardinger, R., **Ecology of newly formed sea ice in the Weddell Sea, Antarctica. I: chlorophyll *a* and nutrients**, *Chinese journal of polar science. Series No. 14*, June 1997, 8(1), p.18-26, 13 refs.

Textural composition, chlorophyll *a* and nutrients (phosphate, nitrate and silicate) of newly formed ice from the Weddell Sea were analyzed during the autumn of 1992. Frazil ice, congelation ice and mixed frazil/congelation ice were the main textural types. Mean concentrations of chlorophyll *a* and nutrients varied considerably with ice texture. High chlorophyll *a* occurred mostly in ice floes consisting mainly of frazil ice. Nutrients were significantly lower in frazil ice than in congelation ice. Similar observations were made in one-year old sea ice. (Auth. mod.)

#### F-58103

Yan, M., **Preliminary study on oxygen isotope of ice cores of Collins Ice Cap, King George Island, Antarctica**, *Chinese journal of polar science. Series No. 14*, June 1997, 8(1), p.65-71, 12 refs.

Oxygen isotope concentrations in glacier-forming material shows no difference at different altitudes of the Collins Ice Cap, and the  $\delta^{18}\text{O}$  variations of surface firn are extremely small. Affected by seasonal variations of temperature, the oxygen isotope composition of winter layers is distinctly different from that of summer layers, whose  $\delta^{18}\text{O}$  value is higher and the variation coefficient is smaller. By means of direct comparison, the oxygen isotope/temperature gradient of the ice cap is defined as 0.74 per mill/°C of the annual mean temperature. (Auth. mod.)

#### F-58123

Cooper, A.P.R., **Historical observations of Prince Gustav Ice Shelf**, *Polar record*, Oct. 1997, 33(187), p.285-294, 22 refs.

Prince Gustav Ice Shelf, situated between James Ross I. and Trinity Peninsula, has retreated rapidly between 1989 and 1995. This paper re-examines historical accounts of the area and plots the position of the ice shelf at various times, from 1843 onwards. These results show that an episode of rapid retreat between 1957 and 1959 preceded the recent rapid retreat, and that the ice shelf has been retreating for most of the period since 1843. The mechanisms underlying the two periods of rapid retreat are considered. (Auth.)

#### F-58129

McConnell, J.R., Bales, R.C., Davis, D.R., **Recent intra-annual snow accumulation at South Pole: implications for ice core interpretation**, *Journal of geophysical research*, Sep. 27, 1997, 102(D18), p.21,947-21,954, 14 refs.

This paper uses a unique, 7.25-yr record of recent, year-round monthly snow accumulation at the Amundsen-Scott Station to compute the number of years of averaging required to statistically ensure that an ice core record would have equivalent representation of snow from each month of the calendar year. For current South Pole meteorological conditions, averaging times of the order of 300 years are required to ensure equal representation of each month, with May being the least well-represented month. To ensure equal representation of 3-month seasons still requires averaging times of the order of 130 years. (Auth. mod.)

#### F-58162

Cavaliere, D.J., Gloersen, P., Parkinson, C.L., Comiso, J.C., Zwally, H.J., **Observed hemispheric asymmetry in global sea ice changes**, *Science*, Nov. 7, 1997, 278(5340), p.1104-1106, 22 refs.

From Nov. 1978 through Dec. 1996, the areal extent of sea ice decreased by 2.9% per decade in the Arctic and increased by 1.3% per decade in the Antarctic. The observed hemispheric asymmetry in these trends is consistent with a modeled response to a carbon dioxide-induced climate warming. The interannual variations, which are 2.3% of the annual mean in the Arctic, with a predominant period of about 5 years, and 3.4% of the annual mean in the Antarctic, with a predominant period of about 3 years, are uncorrelated. (Auth.)

#### F-58166

Watanabe, O., ed, **Antarctica: East Queen Maud Land - Enderby Land Glaciological Folio**, Glaciological Folio Series, Tokyo, National Institute of Polar Research, Apr. 1997, var. p., Refs. passim.

This binder presents the results of a comprehensive glaciological research program carried out, in east Queen Maud Land and Enderby Land, by the Japanese antarctic research expeditions between 1967 and 1997. Included are maps of the area investigated showing the following: the ice sheet surface features; the prevailing windfield, inferred from the snow surface topography; snow accumulation (surface mass balance); snow surface features along various traverse routes; the 10-m snow temperature; bedrock topography; and a base map. Each map comes with a text discussing the data and a list of references.

#### F-58182

Kang, J.C., Wen, J.H., **Comprehensive records of global change from polar ice cores, loess profiles and deep sea cores for last 150 000 years**, *Chinese journal of polar research*, June 1997, 9(2), p.134-144, In Chinese with English summary. Refs. p.142-143.

Studies of mid-latitude loess profiles and comparison with polar ice cores and deep sea cores provide a general pattern of global environmental change and regional differentiation over the last 150,000 years. The last Interglacial, 140,000 yr B.P., is divided into 5 stages; the last Glacial, 80,000-10,000 yr B.P., is divided into 3 stages. The Interglacial shows 4 warm, and 3 cold, cycles.

#### F-58193

Richardson, C., Aarholt, E., Hamran, S.E., Holmlund, P., Isaksen, E., **Spatial distribution of snow in western Dronning Maud Land, East Antarctica, mapped by a ground-based snow radar**, *Journal of geophysical research*, Sep. 10, 1997, 102(B9), p.20,343-20,353, Refs. p.20,352-20,353.

During the summer 1993-94, the spatial distribution of snow was mapped by a ground-based snow radar in western Queen Maud Land. Snow radar soundings were performed along continuous profiles extending from the ice shelf up to the polar plateau, a total distance of 1040 km. The high-resolution radar registrations revealed subsurface layering in the uppermost 12 m of the snowpack. The snow layering was well developed in the coastal area and less well developed on the polar plateau. High spatial variability in snow accumulation was observed on a regional as well as



on a local scale. The variability was very high in areas with large surface slopes, such as the grounding zone and around nunataks. The highest variability was recorded in the nunatak area. (Auth. mod.)

#### F-58194

International Geoscience and Remote Sensing Symposium, Singapore, Aug. 3-8, 1997, **IGARSS'97. Remote sensing—a scientific vision for sustainable development**, New York, Institute of Electrical and Electronics Engineers, 1997, 2105p. (4 vols.), Refs. passim. For selected papers see 52-1091 through 52-1141, or F-58196 through F-58200, F-58202 through F-58207 I-58195 and I-58201.

#### DLC QE33.2.R4I57 1997

This conference deals mainly with satellite remote sensing of the atmosphere, land, and oceans; 13 papers are pertinent to the Antarctic. They include the following: SSM satellite determination of the total water vapor in the atmosphere; classification and distribution of sea ice from AVHRR satellite images; discrimination between clouds and sea ice by AVHRR images; measuring sea ice concentration and floe size by ship-borne video camera; detection of sea ice edges by SAR; an algorithm to derive sea ice concentration from brightness temperatures in satellite images; surface temperatures of the ice sheet from satellite radiometer data, 1979-1975; the effect of clouds and humidity on sea ice concentration; the effect of air temperature and wind on sea ice concentration; SAR for ship navigation; satellite sea ice mapping for ship routing to the Australian antarctic stations; sea ice classification from satellite scatterometer images; and ice edge detection from satellite scatterometer images.

#### F-58196

Baraldi, A., Meloni, G.P., Parmiggiani, F., **Radiance thresholds and texture parameters for Antarctic surface classification**, International Geoscience and Remote Sensing Symposium, Singapore, Aug. 3-8, 1997. IGARSS'97. Remote sensing—a scientific vision for sustainable development. Vol.1, New York, Institute of Electrical and Electronics Engineers, 1997, p.67-69, 7 refs.

#### DLC QE33.2.R4I57 1997

A sequence of AVHRR images is investigated in order to obtain information about sea ice distribution in the Ross Sea. A supervised classifier, based on decision rules in AVHRR NearIR (2) and thermal (3 and 4) channels, is tuned to the given data set to extract pixels belonging to classes: a) sea; b) multiyear ice (ice shelves and bergs); c) first season ice types (floes and pack); and d) clouds (thin/thick clouds, water clouds and ice clouds). Pixel-based classification is affected by underestimation of ice clouds due to interference of multiyear ice and pack. To reduce ice/cloud misclassification, an alternative classification approach exploiting textural information is attempted. (Auth. mod.)

#### F-58197

Muramoto, K., Saito, H., Matsuura, K., Yamanouchi, T., **Cloud and ice detection using NOAA/AVHRR data**, International Geoscience and Remote Sensing Symposium, Singapore, Aug. 3-8, 1997. IGARSS'97. Remote sensing—a scientific vision for sustainable development. Vol.1, New York, Institute of Electrical and Electronics Engineers, 1997, p.73-75, 10 refs.

#### DLC QE33.2.R4I57 1997

In the polar regions, it is difficult to discriminate between clouds and ground surface from satellite visible or infrared data, because of the high albedo and low surface temperature of snow and ice cover. In this paper, a method to classify cloud, sea ice and ground is proposed. This study is based upon analysis of the NOAA/AVHRR infrared images in Antarctica. The algorithm consists of two major approaches: extraction of image features and a classification algorithm. Minimum distance classifier was used to classify that region into one of three categories using five image features. To improve the classification accuracy, threshold boundaries for minimum distance classifier were changed. Both classified and misclassified areas were decreased with increasing the threshold levels. (Auth.)

#### F-58198

Muramoto, K., Endoh, T., Kubo, M., Matsuura, K., **Sea ice concentration and floe size distribution in the Antarctic using**

**video image processing**, International Geoscience and Remote Sensing Symposium, Singapore, Aug. 3-8, 1997. IGARSS'97. Remote sensing—a scientific vision for sustainable development. Vol.1, New York, Institute of Electrical and Electronics Engineers, 1997, p.414-416, 9 refs.

#### DLC QE33.2.R4I57 1997

A technique is described for measuring sea ice characteristics over a wide area of ice covered water. The sea ice was photographed by video camera from the ship. Continuous video images are obtained using geometric transformation and template matching. Both size of the ice and concentration along the ship's route can be obtained continuously. (Auth.)

#### F-58199

Schmidt, R., Hunewinkel, T., **Compatibility of sea ice edges detected in ERS-SAR images and SSM/I data**, International Geoscience and Remote Sensing Symposium, Singapore, Aug. 3-8, 1997. IGARSS'97. Remote sensing—a scientific vision for sustainable development. Vol.1, New York, Institute of Electrical and Electronics Engineers, 1997, p.417-419, 6 refs.

#### DLC QE33.2.R4I57 1997

Sea ice changes directly the wave dynamics and has an impact on the nonlinear imaging of ocean waves by SAR. The energy distribution of the SAR image spectrum of a wave system propagating in sea ice deviates characteristically from the energy distribution of the same wave system propagating in open water. In this study parameters have been derived from the second moments of SAR image spectra, which are suitable to describe this effect quantitatively. These parameters are used to define an ice edge. Results of this analysis are compared with ice concentration isolines derived from SSM/I data using the NASA Team algorithm, and with a high resolving ice edge detection algorithm based on the 85 GHz channels of the SSM/I. Ice edges detected in ERS-SAR images agree well with the 30% ice concentration isolines of the NASA Team algorithm. The ice edge detection algorithm for the SSM/I data is in good agreement with the SAR ice edge. (Auth. mod.)

#### F-58200

Comiso, J.C., Zwally, H.J., **Temperature corrected Bootstrap algorithm**, International Geoscience and Remote Sensing Symposium, Singapore, Aug. 3-8, 1997. IGARSS'97. Remote sensing—a scientific vision for sustainable development. Vol.2, New York, Institute of Electrical and Electronics Engineers, 1997, p.857-861, 16 refs.

#### DLC QE33.2.R4I57 1997

A temperature corrected Bootstrap Algorithm has been developed using Nimbus-7 Scanning Multichannel Microwave Radiometer data. The procedure first calculates the effective surface emissivity, and a mixing formulation that utilizes ice concentrations using brightness temperatures from 6 GHz and 37 GHz channels. These effective emissivities are then used to calculate surface ice temperatures which in turn are used to convert the 18 GHz and 37 GHz brightness temperatures to emissivities. Ice concentrations are then derived using the same technique as with the Bootstrap algorithm but using emissivities instead of brightness temperatures. The results show significant improvements in areas where ice temperature is expected to vary considerably such as near the continental areas in the Antarctic, where the ice temperature is colder than average, and in marginal ice-zones. (Auth. mod.)

#### F-58202

Oelke, C., **Influence of the atmosphere on the remote sensing of sea ice using passive microwave radiometers**, International Geoscience and Remote Sensing Symposium, Singapore, Aug. 3-8, 1997. IGARSS'97. Remote sensing—a scientific vision for sustainable development. Vol.3, New York, Institute of Electrical and Electronics Engineers, 1997, p.1311-1313, 7 refs.

#### DLC QE33.2.R4I57 1997

The effects of weather systems on sea-ice concentration retrievals using passive microwaves are investigated because significant errors in estimating short-time variations and climatological concentration trends occur due to clouds and water vapor. For the assessment of these weather effects, the atmospheric parameters integrated water vapor content (W) and cloud liquid water path (LWP) are derived from radiosonde ascents



measured in the pack-ice area of the Weddell Sea/Antarctica in 1992. Using a microwave radiative transfer model and typical surface emissivities, brightness temperatures are calculated from the radiosonde ascents. The first-year, multiyear and total sea-ice concentrations are calculated using the NASA team sea-ice algorithm for the SSM/I radiometer (Special Sensor Microwave/Imager). Using these results the derived sea-ice concentrations can be corrected for the modelled atmospheric effects. (Auth. mod.)

#### F-58203

Danduran, P., Mouchot, M.C., Garello, R., Fleury, D., Thépaut, I., **First realtime use of RADARSAT SAR imagery for ship navigation in Antarctica**, International Geoscience and Remote Sensing Symposium, Singapore, Aug. 3-8, 1997. IGARSS'97. Remote sensing—a scientific vision for sustainable development. Vol.4, New York, Institute of Electrical and Electronics Engineers, 1997, p.1678-1680, 5 refs.

#### DLC QE33.2.R4I57 1997

In polar regions, navigation strongly depends on ice conditions which can be defined by ice types and ice concentration. For a long time, satellite imagery, specially AVHRR and SAR data, has been providing such information. Henceforth, until now the availability of SAR images for ship navigation in Antarctica was not sufficient for this data to be used in a realtime approach. However, due to its onboard recorder, the Canadian satellite, RADARSAT, can acquire images over Antarctica on a regular basis. The experiment presented in this paper investigates its potential for ship routing to Antarctica and, in particular, towards the Dumont d'Urville Station. (Auth.)

#### F-58204

Fischer, H., Oelke, C., **Sea ice concentration in response to weather systems in the Weddell Sea: comparison between SSM/I data and model simulations**, International Geoscience and Remote Sensing Symposium, Singapore, Aug. 3-8, 1997. IGARSS'97. Remote sensing—a scientific vision for sustainable development. Vol.4, New York, Institute of Electrical and Electronics Engineers, 1997, p.1686-1688, 7 refs.

#### DLC QE33.2.R4I57 1997

This study compares sea ice concentrations derived from Special Sensor Microwave/Imager (SSM/I) data with results from a dynamic-thermodynamic sea ice model forced by daily means of air temperature and wind. The analyses focus on two regions with different ice characteristics and concentrations in the eastern and western Weddell Sea for the austral winter period June to July 1992. Additional synoptic observations, surface and radiosonde measurements from a RV *Polarstern* cruise are used for validation. Fluctuations of wind and air temperature are found to be equally important for rapid changes of sea ice concentrations on a daily time scale. The typical reduction of SSM/I-derived sea ice concentration is in the range of 5-10% for transient cyclones, but simulated ice concentrations are reduced by 5%. (Auth.)

#### F-58205

Williams, R.N., Crowther, P., Pendlebury, S.F., **Design and development of an operational sea ice mapping system for meteorological applications in the Antarctic**, International Geoscience and Remote Sensing Symposium, Singapore, Aug. 3-8, 1997. IGARSS'97. Remote sensing—a scientific vision for sustainable development. Vol.4, New York, Institute of Electrical and Electronics Engineers, 1997, p.1689-1691, 6 refs.

#### DLC QE33.2.R4I57 1997

A semi-automated sea ice mapping system has been developed for use by meteorologists responsible for providing information to antarctic shipping on current sea ice conditions in the vicinity of Casey, Davis and Mawson stations. The system uses AVHRR images from NOAA satellites and processes these images to identify areas of cloud, open water and sea ice. It further analyzes sea ice regions to determine concentrations of sea ice found within these regions. The system is currently being used on a trial basis, at the Bureau of Meteorology in Hobart, to evaluate its effectiveness, prior to installation at the Casey Station late in 1997. (Auth.)

#### F-58206

Early, D.S., Long, D.G., **Ice classification in the southern ocean using ERS-1 scatterometer data**, International Geoscience and Remote Sensing Symposium, Singapore, Aug. 3-8, 1997. IGARSS'97. Remote sensing—a scientific vision for sustainable development. Vol.4, New York, Institute of Electrical and Electronics Engineers, 1997, p.1838-1840, 5 refs.

#### DLC QE33.2.R4I57 1997

A simple method for classifying southern ocean sea ice from enhanced resolution ERS-1 scatterometer images is presented. The enhanced resolution images are created with the Scatterometer Image Reconstruction (SIR) algorithm. This algorithm uses a dense, irregular sample grid created with multiple, overlapping passes of the ERS-1 scatterometer to achieve resolutions better than the nominal 50 km ERS-1 resolution. Because the scatterometer provides measurements over a range of incidence angles, the incidence angle dependence of the observed  $\sigma^0$  can be used as part of the classification algorithm along with the incidence angle normalized  $\sigma^0$ , improving the accuracy of the classification. In this study, a third parameter, the standard deviation of a measure of the anisotropy, is used to further help delineate sea ice types. (Auth.)

#### F-58207

Remund, Q.P., Long, D.G., **Automated antarctic ice edge detection using NSCAT data**, International Geoscience and Remote Sensing Symposium, Singapore, Aug. 3-8, 1997. IGARSS'97. Remote sensing—a scientific vision for sustainable development. Vol.4, New York, Institute of Electrical and Electronics Engineers, 1997, p.1841-1843, 4 refs.

#### DLC QE33.2.R4I57 1997

Polar sea ice plays an important role in the global climate and other geophysical processes. Although spaceborne scatterometers such as NSCAT have low inherent spatial resolution, resolution enhancement techniques can be utilized to make NSCAT data useful for monitoring sea ice extent in the Antarctic. Dual polarization radar measurements are *A* and *B* values and are used in a linear discrimination analysis to identify sea ice and ocean pixels in composite images. Ice edge detection noise reduction is performed through region growing and erosion/dilation techniques. The algorithm is applied to actual NSCAT data. The resulting edge closely matches the NSIDC SSM/I derived 50% ice concentration edge. (Auth.)

#### F-58217

Hewitt, R.P., **Areal and seasonal extent of sea-ice cover off the northwestern side of the Antarctic Peninsula: 1979 to 1996**, *CCAMLR Science*, 1997, Vol.4, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.65-73, With French, Russian and Spanish summaries. 19 refs.

Analysis of seasonal sea-ice cover of an area measuring  $1.25 \times 10^6$  km<sup>2</sup> off the northwestern side of the Antarctic Peninsula indicates that there were 4 periods of extensive ice cover during the last 18 years. Periods of extensive winter ice cover peaked in 1980, 1986, 1991 and 1995 and were foreshadowed by the late retreat of ice during the springs of 1985, 1990 and 1994. Ice cover during the summer months and winter ice cover during years between periods of extensive ice cover decreased during the second half of the time series. Maximum ice-cover during the periods of extensive ice cover did not change. Annual curves of sea-ice cover were integrated over time to produce an annual index of sea-ice cover in units of 10<sup>6</sup>/month. This index may be used in conjunction with studies of variability in biological production, particularly the reproductive success of antarctic krill, in the Antarctic Peninsula. (Auth. mod.)

#### F-58230

Early, D.S., Long, D.G., **Azimuthal modulation of C-band scatterometer  $\omega^0$  over southern ocean sea ice**, *IEEE transactions on geoscience and remote sensing*, Sep. 1997, 35(5), p.1201-1209, 22 refs.

In a continuing evaluation of the ERS-1 C-band scatterometer as a tool for studying polar sea ice, the authors evaluate the azimuthal modulation characteristics of antarctic sea ice. ERS-1 AMI scatterometer mode data sets from several study regions dispersed in antarctic seasonal sea ice



pack are evaluated for azimuthal modulation. Results show that over the ice pack, azimuthal modulation is less than 1 dB at the scale of observation of the ERS-1 C-band scatterometer. (Auth. mod.)

#### F-58231

Herique, A., Kofman, W., **Determination of the ice dielectric permittivity using the data of the test in Antarctica of the ground-penetrating radar for Mars'98 mission**, *IEEE transactions on geoscience and remote sensing*, Sep. 1997, 35(5), p.1338-1349, 16 refs.

A ground-penetrating radar will be integrated inside the guiderope ballast of the Mars'98 balloon mission. A prototype of this impulse system working in the 5-15 MHz band was tested close to Dumont d'Urville Station in Feb. 1993. This paper describes the performances of the radar and electromagnetic propagation in antarctic glaciers. This knowledge allows to use the frequency wavenumber migration to focus the signal, to increase the signal-to-noise ratio and to rebuild an image of the subsurface. (Auth. mod.)

#### F-58233

Herzfeld, U.C., et al, **Monitoring changes of ice streams using time series of satellite-altimetry-based digital terrain models**, *Mathematical geology*, Oct. 1997, 29(7), p.859-890, Refs. p.888-890.

Applications to Seasat data and data from the Geosat Exact Repeat Mission indicate that the grounding line of Lambert Glacier/Amery Ice Shelf, the largest ice stream in East Antarctica, has advanced 10-12 km between 1978 and 1987-89. The objectives of this paper are to explore possibilities and limitations of satellite-altimetry-based mapping to capture changes for shorter time windows and for smaller areas, and to investigate some methodological aspects of the data analysis. Maps of the lower Lambert Glacier and the entire Amery Ice Shelf are presented for austral winters 1978, 1987, 1988, and 1989. (Auth. mod.)

#### F-58265

Ezraty, R., Gohin, F., Bryère, P., Maroni, C., Cavanié, A., **Determination of sea ice extent and ice types using the AMI-Wind, Antarctica, 1992-1995**, International Workshop on ERS Applications, 2nd, London, UK, Dec. 6-8, 1995. Proceedings, Noordwijk, European Space Agency, 1996, p.215-217, ESA SP-383, 11 refs.

**DLC QE33.2.A7I58**

Because of its stable signature, its continuous operation (when SAR is not switched on), and the systematic data processing by CERSAT, the scatterometer can provide valuable inputs to the monitoring of sea ice on a regional scale. To illustrate this potential, a video film was elaborated; it shows the weekly evolution of ice backscatter and ice extent over the antarctic ocean from 1992 until 1995. (Auth. mod.)

#### F-58266

Thiel, K.H., Hartl, P., Wu, X.Q., **Monitoring the ice movements with ERS SAR interferometry in the antarctic region**, International Workshop on ERS Applications, 2nd, London, UK, Dec. 6-8, 1995. Proceedings, Noordwijk, European Space Agency, 1996, p.219-223, ESA SP-383, 3 refs.

**DLC QE33.2.A7I58**

Monitoring the changes of the ice cover and the movement of the ice in the antarctic region continuously is difficult. ERS SAR interferometry provides a tool to perform this task. For the region around Hemmen Ice Rise, it is demonstrated that topography, tidal variations and horizontal displacements can be estimated. (Auth. mod.)

#### F-58268

Thomas, M., Roth, R., **Monitoring of lead formation and energy exchange in the Weddell Sea**, International Workshop on ERS Applications, 2nd, London, UK, Dec. 6-8, 1995. Proceedings, Noordwijk, European Space Agency, 1996, p.229-234, ESA SP-383, 7 refs.

**DLC QE33.2.A7I58**

In the central Weddell Sea ice drift is driven by the atmospheric forcing. The development of leads and polynyas can be related to the synoptic situation. An ice classification approach based on radiometric and geometric properties and an estimation of sensible heat fluxes using additional meteorological data (synoptical analysis, ECMWF model) is shown for the Weddell Sea. In most of the analyzed cases, the spatial distribution of leads and their size is correlated to their position relative to the prevailing low pressure systems. (Auth. mod.)

#### F-58274

Stammerjohn, S.E., Smith, R.C., **Spatial and temporal variability of western Antarctic Peninsula sea ice coverage**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.81-104, Refs. p.102-104.

**DLC QH541.264.A6F67 1996**

Spatial and temporal variability of sea ice coverage west of the Antarctic Peninsula, the Palmer Long Term Ecological Research (LTER) study area, is analyzed from Oct. 1978 to Aug. 1994, using surface sea ice concentrations derived from passive microwave satellite data. Ice coverage in the LTER region, nearby regions and the southern ocean are compared. Results show that various regions have distinct characteristics in seasonal and interannual variability in contrast to the southern ocean as a whole. Seasonal ice coverage in the LTER and Bellingshausen regions is distinct from other southern ocean regions in that the period of ice advance is relatively short in comparison to the period of ice retreat. In addition, these regions are the only southern ocean regions which show long term persistence in monthly anomalous ice coverage, so that there is an oscillation between high ice years followed by low ice years. This LTER sea ice record provides a basis against which life-history parameters of primary producers and populations of key species from different trophic levels can be monitored. (Auth. mod.)

#### F-58299

Morgan, V., Van Ommen, T.D., **Seasonality in late-Holocene climate from ice-core records**, *Holocene*, Sep. 1997, 7(3), p.351-354, 12 refs.

High-resolution ice-core  $\delta^{18}\text{O}$  data from a site with well preserved seasonal cycles, Law Dome, East Antarctica, are used to extract seasonal temperatures trends over the last 700 years with an effective resolution of a few months. Examination of this record on timescales of decades to centuries shows distinctly different patterns of temperature variation between summer and winter. Over the last 700 years, the summer months show relatively little change. The winters, in contrast, show significant fluctuations including a period of warmer temperatures between 1400 and 1500 and a colder period centered around the early 1800s which corresponds to the latter part of an era of glacier advance and cold winters in Europe sometimes known as the 'Little Ice Age'. (Auth. mod.)

#### F-58300

Sukhorukov, K.K., **Features of the stressed state of sea ice due to failure**, *Russian meteorology and hydrology*, 1997, No.3, p.44-54, Translated from *Meteorologiya i gidrologiya*. 12 refs.

The influence of macrocracks on the bifurcational transformation of the stressed state of ice on a typical linear scale of a few kilometers is found from experimental studies of the stressed-deformed state of the antarctic ice cover during dynamic processes resulting in arterial ice breaks. A bifurcation-sensitive criterion is shown to be the ratio of the spherical stress tensor to the deviator. The criterion can serve as a measure of ice cover macrofailure. (Auth. mod.)

#### F-58334

Wu, X.R., Budd, W.F., Simmonds, I., **Sensitivity of the antarctic sea ice distribution to its advection in a general circulation model**, *Antarctic science*, Dec. 1997, 9(4), p.445-455, Refs. p.454-455.

A dynamic-thermodynamic sea ice model is used and coupled with an atmospheric general circulation model to simulate the seasonal cycle of the global sea ice distribution. The authors have run the coupled system and obtain a creditable seasonal simulation of the antarctic sea ice. To understand the role of ice advection on the seasonal cycle of antarctic sea



ice in the coupled system, results from the thermodynamic-only (T) sea ice model have been compared with those from the dynamic thermodynamic (DT) sea ice model. The seasonal cycle of sea ice differs between the two models. When ice motion is eliminated sea ice becomes more compact and thinner, and sea ice is more extensive in summer. Experiments have been performed with a fully coupled atmosphere sea ice system, and also using prescribed daily atmospheric forcing and monthly mean atmospheric forcing, to examine the differences of the sensitivity of the ice advection between the coupled and forcing models. Similar differences have been observed between DT and T in the forcing models. (Auth. mod.)

#### F-58342

Gao, X.Q., Jacka, T.H., **Experimental investigations on ice with single maximum fabric under uniaxial compression**, *Journal of glaciology and geocryology*, Mar. 1996, 18(1), p.58-63, In Chinese with English summary. 15 refs.

An account is given of ice deformation experiments under uniaxial compression. Samples studied include ice with single maximum fabric from cores drilled on Law Dome and laboratory prepared isotropic polycrystalline ice. The tests were carried out at  $-3.3^{\circ}\text{C}$  and an octahedral shear stress of 0.3 MPa. The minimum strain rates for core samples are a factor of ca. 4 lower than the isotropic minimum strain rate. This result indicates that the anisotropy does not enhance the strain rate. The approach to similar tertiary strain rates has been found for core ice and laboratory prepared ice, associated with the development of tertiary creep. The resultant fabric pattern in both types of ice is small circle girdle with equilibrium crystal size. It has been demonstrated that small circle girdle fabric is more compatible with compressive stress configuration than single maximum fabric. (Auth.)

#### F-58343

Ren, J.W., **Traverse expedition to the Lambert Glacier basin, eastern Antarctica**, *Journal of glaciology and geocryology*, Dec. 1995, 17(4), p.303-307, In Chinese with English summary. 5 refs.

The Lambert Glacier, feeding into the Amery Ice Shelf, is the largest ice stream in the East Antarctic ice sheet. Preliminary results from recent traverse along a route across its inland accumulation area show that the accumulation rate in this area is very low, not exceeding  $150 \text{ kg}/(\text{m}^2\cdot\text{a})$  at most sites. The mean annual temperature ranges from  $-45^{\circ}\text{C}$  to  $-30^{\circ}\text{C}$ . Average density of surface 2 m snow is around  $400 \text{ kg}/\text{m}^3$ . Depth-hoar is seen at many sites with an elevation between 1830 and 2700 m. The surface velocity is generally within 20 m/a. Snow redistribution caused by strong katabatic-wind and sastrugi brings about an uncertainty in the annual-layer identification using  $\delta^{18}\text{O}$  profile in low accumulation area. (Auth.)

#### F-58344

Gao, X.Q., Jacka, T.H., **Comparisons of the creep and crystallographic properties of laboratory prepared ice with core ice**, *Journal of glaciology and geocryology*, Dec. 1995, 17(4), p.343-349, In Chinese with English summary. 11 refs.

An account is given of ice deformation experiments in uniaxial compression. Samples studied include isotropic and anisotropic ices, laboratory prepared and from a core drilled near the summit of Law Dome. There are unexplained differences in the minimum strain rates attained by isotropic ices from the core and from the laboratory. Minimum strain rates for anisotropic ice are higher than that of isotropic ice provided that the anisotropy is compatible with the stress configuration. The approach to similar tertiary creep rates has been found for antarctic core ice and laboratory prepared ice, associated with the development of tertiary creep. The resultant fabric patterns are the same in both types of ice and the crystal sizes are also similar. (Auth.)

#### F-58347

Jouzel, J., et al, **Abrupt climatic changes: a global perspective from ice cores**, NATO Advanced Research Workshop, Ringberg, Germany, Mar. 21-25, 1994. Proceedings. Clouds, chemistry and climate. Edited by P.J. Crutzen et al and NATO ASI, Series I. Global Environmental Change. Vol.35, Berlin, Springer-Verlag, 1996, p.83-108, Refs. p.103-108.

In 1992, the GRIP European deep drilling (Greenland Ice Core Project) reached the bedrock in central Greenland. One year later, the US Greenland Ice Sheet Project (GISP2) successfully completed a second drilling in the same region. These two cores have been analyzed for their ice oxygen 18 content. This paper reviews the important climatic information derived from those profiles and places them in a global perspective through a comparison with the Vostok deuterium record from Antarctica. The means by which these isotopic changes provide a record of the local temperature at the time of formation of the precipitation is summarized. (Auth. mod.)

See also:

A-56559 A-56967 A-57525 A-57537 B-56501 B-56509 B-56561 B-56617 B-56658 B-56790 B-56931 B-57032 B-57049 B-57130 B-57201 B-57223 B-57325 B-57355 B-57607 B-57615 B-57635 B-57652 B-57689 B-57725 B-57756 B-57757 B-57761 B-57780 B-57894 B-57902 B-57904 B-57905 B-57994 B-57995 B-58059 B-58276 B-58278 B-58282 B-58284 B-58289 B-58327 B-58350 C-56622 C-56846 C-57038 C-57048 C-57074 C-57541 C-57610 E-56374 E-56415 E-56447 E-56478 E-56546 E-56548 E-56683 E-56693 E-56866 E-56904 E-56944 E-57028 E-57094 E-57128 E-57209 E-57271 E-57358 E-57516 E-57665 E-57743 E-57749 E-57766 E-57836 E-57971 E-58064 E-58067 E-58089 E-58167 E-58247 E-58248 E-58249 E-58251 G-56391 G-56392 G-56531 G-56555 G-56557 G-56625 G-56778 G-57206 G-57317 G-57318 G-57464 G-57465 G-57466 G-57467 G-57472 G-57776 G-57884 G-58137 G-58138 I-56347 I-56349 I-56362 I-56384 I-56420 I-56435 I-56436 I-56437 I-56460 I-56462 I-56586 I-56611 I-56614 I-56637 I-56638 I-56646 I-56668 I-56691 I-56692 I-56767 I-56794 I-56795 I-56796 I-56797 I-56798 I-56838 I-56844 I-56862 I-56939 I-56962 I-56975 I-56981 I-56994 I-57076 I-57163 I-57174 I-57181 I-57222 I-57242 I-57338 I-57339 I-57364 I-57420 I-57430 I-57431 I-57450 I-57493 I-57526 I-57528 I-57531 I-57543 I-57544 I-57545 I-57546 I-57552 I-57571 I-57576 I-57577 I-57578 I-57579 I-57580 I-57612 I-57681 I-57692 I-57696 I-57697 I-57703 I-57767 I-57768 I-57773 I-57787 I-57794 I-57811 I-57861 I-57962 I-58005 I-58007 I-58008 I-58009 I-58010 I-58022 I-58029 I-58031 I-58041 I-58078 I-58093 I-58132 I-58139 I-58156 I-58157 I-58201 I-58210 I-58264 I-58275 J-56380 J-56439 J-56661 J-56889 J-56958 J-56977 J-57101 J-57170 J-57188 J-57473 J-57527 J-57532 J-57567 J-57623 J-57802 J-57881 K-57533 L-56473 L-56475 L-57981 L-57984 M-57025



## G. LOGISTICS, EQUIPMENT & SUPPLIES

### G-56387

Brezonick, M., **Antarctic no match for Ivan the Terra Bus**, *Diesel progress engines and drives*, May 1996, 62(5), p.10-11.

This vehicle is designed to operate successfully in the severe climate at McMurdo Station and its surroundings. It is equipped with special heating systems for its engine and transmission and its passengers, to provide reliable, safe, and continuous transport in the McMurdo complex.

### G-56391

Sutherland, A.L., **Nathaniel B. Palmer, new NSF antarctic ice-breaker**, MTS '92, Washington, D.C., Oct. 19-21, 1992. Proceedings. Global ocean partnership. Vol.2, Washington, D.C., Marine Technology Society, 1992, p.861-865, 4 refs.

#### DLC GC2.M78 1992

The 308-foot, 6,800-ton, ABS A2, research vessel-icebreaker, *Nathaniel B. Palmer*, was commissioned on Mar. 13, 1992. The ship immediately proceeded to the antarctic ocean and has been working in ice covered waters since that time. This paper provides a brief review of the *Nathaniel B. Palmer*, its technical specifications, the suite of scientific outfitting aboard the vessel and an assessment of the performance of the vessel during the first months of operation. (Auth.)

### G-56392

Kennedy, H., Sutherland, A., Voelker, R., St. John, J., **Science features of the new U.S. antarctic research vessel with icebreaking capability: Nathaniel B. Palmer**, MTS '91, New Orleans, LA, Nov. 10-14, 1991. Proceedings. An ocean cooperative: industry, government and academia. Vol.1, Washington, D.C., Marine Technology Society, 1991, p.19-25, 5 refs.

#### DLC GC2.M78 1991

This paper describes the new U.S. antarctic research vessel *Nathaniel B. Palmer* that was designed and built to provide the nation with a year-round capability in the south polar region. The vessel's annual operating profile, performance requirements, the acquisition process, and the scientific suite are described. The procedure for scientists and engineers to perform research aboard the vessel are provided in the concluding remarks. (Auth.)

### G-56394

U.S. National Science Foundation/American Institute of Architecture. Student Monograph Competition, **Environment 2: a new town for science**, Washington, D.C., May 1993, 83p., Refs. passim. For selected papers see 51-1778 through 51-1781 or G-56395 through G-56397 and H-56398.

In conjunction with a comprehensive, graphically illustrated design competition, the American Institute of Architecture Students (AIAS) and the National Science Foundation (NSF) invited all students enrolled in U.S. colleges and universities to submit a specialized research paper to be published in this monograph collection, *Environment 2: A new town for science*, on the design of antarctic habitats. Papers were judged in the categories of community planning, habitat construction, infrastructure and power systems, environmental factors, and human behavioral factors. This collection includes 5 winning papers which are preceded by an adaptation from remarks made to an Environment 2 planning meeting by Dr. Peter E. Wilkness, NSF Director, Division of Polar Programs.

### G-56395

Burley, J.B., **Design paradigms and the functional adaptation model: a theoretical basis to examine heterogeneous environmental design approaches for McMurdo Station, Antarctica—A new town for science**, U.S. National Science Foundation/American Institute of Architecture Students. Student monograph competition. Environment 2: a new town for science,

Washington, D.C., May 1993, p.5-19, 30 refs.

This paper examines discrete design paradigms applicable to the creation of "a new town for science," at McMurdo Station and suggests that the design of a new town for science may combine a set of design paradigms imbedded within each other to create a city that has meaning at a variety of distinct intellectual levels. (Auth. mod.)

### G-56396

Burley, J.B., **Bioclimate energy dynamics at McMurdo Station, Antarctica**, U.S. National Science Foundation/American Institute of Architecture Students. Student monograph competition. Environment 2: a new town for science, Washington, D.C., May 1993, p.31-39 + appends., 2 refs.

This paper examines the potential for glazing to be employed as a passive solar radiant energy inlet. The study determined that during the summer months, the energy levels passing through a 10 x 10 foot window, with three panes, each 1/4 in. thick facing north for a building maintained at 60°F results in a substantial gain for the structure and a substantial loss during the winter, requiring blockage and further insulation during the winter months. In addition, the study determined that reduction of wind flux around the structures can further reduce energy loss. (Auth.)

### G-56397

Burley, J.B., **Environmental spatial modeling for McMurdo Station, Antarctica: a geographic information systems analysis and application**, U.S. National Science Foundation/American Institute of Architecture Students. Student monograph competition. Environment 2: a new town for science, Washington, D.C., May 1993, p.57-76, 34 refs.

This paper presents an overview of geographic information systems technology applicable for site development of McMurdo Station. With the development of micro-computer technology, enabling rapid calculation of spatial algorithms, geographical information systems (GIS) are presently in an enhanced position to conduct investigations which explore the spatial conditions for the development of new towns. This process has been labeled "mapematics." The results can be presented in a two-dimensional format, printed output, and in film format for public consumption. The results of this study indicate that there are two major bands of land at the station that are most suitable for development; a substantial portion is less suitable due to steep slopes, proximity to shorelines, permanent snow/ice fields, historic sites, aspect, and distance from loading docks. (Auth. mod.)

### G-56456

Wade, J.W., **Interruptability robustness and dynamic contingency management model**, Automatic control, World Congress. Proceedings of the 12th Triennial World Congress of the International Federation of Automatic Control, Sydney, Australia, 18-23 July 1993, Vol. 4, edited by G.C. Goodwin and R.J. Evans, [London], Elsevier, 1994, p.447-450, 7 refs.

#### DLC TJ212.2.I58 1993b vol.4

Assembly interruptability is a problem of increasing concern for construction projects which take place in hazardous environments. Interruptability is the susceptibility and resiliency of a project to an unplanned interruption of the assembly process. When the assembly process takes place in a hazardous environment, such as space, undersea, or Antarctica, interruptions may jeopardize the survival of the structure being assembled, or the safety of the members of the construction crew. This paper presents a methodology to solve the interruptability problem and provides a dynamic contingency manager for assembly projects in a hazardous environment. The model was applied to the present problem of interruptability during the assembly of the United States Space Station Freedom. However, the general nature of the model allows it to be applied to other space construction projects such as the lunar base and orbital assembly of the



manned Mars spacecraft, as well as earth-based construction projects such as undersea laboratories, antarctic bases, skyscrapers, etc. The Interruptability Robustness Model sets forth a solution to the interruptability problem and at the same time can provide a dynamic, contingency management system. (Auth. mod.)

#### G-56486

Dabholkar, D.A., Aggarwal, U.K., Sood, R.C., **Development of fire resistant paint for Antarctica**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.187-196, 15 refs.

DLC G850.I53I53 1984

Antarctica, with large desolate areas of snow and ice cover, few landmarks and hostile weather, represents extreme conditions of low temperature and high wind velocity. A fireproof paint, which has fire-retardant properties and can simultaneously withstand the antarctic conditions, was developed, evaluated and successfully applied to the wooden structures used at the Indian antarctic stations. (Auth.)

#### G-56487

Dabholkar, D.A., Saroop, U.K., Sood, R.C., Aggarwal, A.K., **Preliminary testing report of some commercial polymers and their utilisation in the antarctic climatic conditions**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.197-203, 7 refs.

DLC G850.I53I53 1984

The effects of extreme low temperature and high wind velocity conditions existing in Antarctica have been investigated on various polymeric materials. The selection of polymeric materials ranged from simple polyolefinic polymers, like Low Density Polyethylene (LDPE) and Polypropylene (PP), to engineering and specialty polymers like Acrylonitrile Butadiene Styrene Copolymer (ABS), Polycarbonate and Poly-tetrafluoroethylene (PTFE). The polymeric samples were exposed to the antarctic climate for one month. The samples were then evaluated for thermal, mechanical and electrical properties. No significant changes were observed. Conclusions about the effect of antarctic climate on the polymers can, however, be drawn only after detailed evaluation of samples exposed for one year. (Auth. mod.)

#### G-56488

Puri, A., **Technical notes on renewable energy systems to be used at the Indian station**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.205-208.

DLC G850.I53I53 1984

Renewable energy systems utilizing the wind and solar energy have shown promising results in Antarctica. This paper describes the various renewable energy systems that are proposed to supplement the existing conventional sources of energy. (Auth.)

#### G-56531

Diemand, D., Alger, R., Klovov, V., **Snow road enhancement, Transportation research record**, 1996, No.1534, Geosynthetics: cold regions, flexible pavements, and other issues, p.1-4, 2 refs.

Snow roads are used extensively in areas where seasonal access to remote areas would otherwise be difficult or impossible for wheeled vehicles. Forestry operations in Scandinavia and Canada, petroleum operations in Alaska and Canada, and almost all activities in Antarctica make extensive use of this technology. Many techniques of preparing snow roads and runways have been used and studied, but the most intractable problems remain unsolved: how to extend the service life of the road as the warm season approaches and how to bridge damaged or transitional sections. Other, less important problems include sinkage of parked vehicles, damage to heavily trafficked areas, damage caused by fluid spills and infiltration by saltwater, and use limited to vehicles with low tire pressures. Research addressing these problems was conducted, and the preliminary results are encouraging. A short test section of road was constructed with geocells. This material is designed for use with sand or gravel but, instead,

the cells were filled with packed snow. The resulting surface was very hard, stable, and resistant to damage by repeated passes by wheeled traffic. Paving blocks were also prepared by converting snow directly to ice by using very high compaction pressures in a hydraulic press. The material was very strong and was resistant to the infiltration of fluids of all kinds. The application of these two techniques would greatly reduce most problems encountered in the use of snow roads and runways.

#### G-56554

Gangadhara, R.S., **Life support systems at Indian antarctic station: Maitri**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.275-282.

The life support systems at Maitri Station, comprising central heating, electricity generation and supply, water supply and waste disposal systems are run and maintained throughout the year. The various equipment used and procedural details are discussed. (Auth.)

#### G-56555

Raka, A.S., **On the construction of shelter accommodation within C & N Hangar, Dakshin Gangotri, Antarctica**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.283-286.

Operations at Dakshin Gangotri Station, the first Indian antarctic station, were discontinued in 1989 and the station was converted into a supply base during Feb. 1990. Since regular wintering convoys would visit the station for ferrying the fuel and other cargo, it was envisaged to construct a 'Transit Accommodation' for eight personnel members within the existing C&N Hangar at the station. This hangar constructed during the Fourth Indian Expedition in 1984 to serve as a vehicle shelter, is completely buried in the snow at present. It is a well designed unit equipped with all communication facilities. (Auth. mod.)

#### G-56556

Vishwanathan, S., **Communication during Ninth Expedition**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.287-290.

The major task of the communications team of the 9th Indian antarctic expedition was to dismantle and shift communication equipment from the Dakshin Gangotri Station to Maitri Station. This was accomplished during Feb. 1990. Much of the material was transported by surface convoys, leaving behind some equipment in a hangar at Dakshin Gangotri, including the frames of 5KW Tx's; the units themselves were transported to Maitri Station. Various types of communication linking Maitri Station with the outside world are described.

#### G-56557

Singh, B., **Surface transport over snow and ice terrain in Antarctica**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.291-298.

Haulage of fuel and cargo from the shelf and Dakshin Gangotri Station to India's permanent antarctic station, Maitri, involves surface transport over 130 km of snow and ice. During the austral winter of 1990, the 7th Indian wintering team operated 7 convoys to Dakshin Gangotri Station and 2 to the Wohlthat Mountains. Convoy details and description of the vehicles used, and their performance, are given.

#### G-56558

Pathak, R.C., Gangadhara, R.S., **Some constructional, environmental control and plant growth aspects of green house at Indian antarctic station "Maitri"**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.299-311, 5 refs.

During the 9th Indian expedition, a greenhouse was added to the main building of Maitri Station for the purpose of growing ornamental plants and some green vegetables on an experimental basis. The size of the greenhouse is 10.6 x 2.66 m; its location is such as to get a maximum sun-



light-through-glass-house effect. Principle of modular construction has been adopted for selection of the size and structural components. An environmental control system, to simulate conditions suitable for plant growth in the severe climatic conditions of Antarctica, has been incorporated in the greenhouse. Temperature, humidity, oxidation, carbon dioxide, illumination, air change and pH value have been kept in mind while designing the systems. Construction details and plant growth data are given.

#### G-56572

Webb, J.W., Easterly, C.E., **Travel to US field stations in Antarctica in preparation for environmental impact studies**, *Oak Ridge National Laboratory. Foreign trip report*, Mar. 24, 1993, ORNL/FTR-4552, 14p., DE93 011815.

The trip covered the period from Jan. 4 through Feb. 22, 1993. The travelers visited Antarctica at the request of the National Science Foundation (NSF) for the purpose of gaining firsthand knowledge of the major environmental issues related to the US antarctic research activities and support operations. The NSF's activities were evaluated under the requirements of the Madrid Protocol that Antarctica be protected for its own intrinsic value and its unique usefulness for future scientific research. The visit was planned to augment and extend investigations undertaken in Oct. and Nov. 1992. Several activities in the vicinity of McMurdo Station and Amundsen-Scott Station were surveyed for possible future environmental impact analyses. (Auth. mod.)

#### G-56573

Croteau, K., Harris, C., **Prototype system to support helicopter tracking operations**, *GIS world*, Aug. 1996, 9(8), p.42-45, 2 refs.

Tracking a helicopter fleet, passengers, and cargo in a potentially hazardous antarctic environment can be a challenge. Researchers at the International Centre for Antarctic Information and Research, Christchurch, New Zealand, developed the Helicopter Operations Tracking System (HOTS), a prototype information system to manage, query and display data related to helicopter operations at Antarctica's largest center of helicopter operations: the U.S. Antarctic Program at McMurdo Station. HOTS links GIS (Geographic Information Systems) to a relational database to analyze operational data and produce informative graphs, tables and maps in and for the McMurdo/Scott Base, Dry Valleys, Mount Erebus, and near Victoria Land region.

#### G-56578

Hughes, J., **Evaluation of protective coatings for the *in situ* preservation of historic timber buildings in a harsh antarctic environment**, *Materials issues in art and archeology III*. Vol.267. Symposium held Apr. 27-May 1, 1992, San Fransico, CA, USA. Edited by P.B. Vandiver, J.R. Druzik, G.S. Wheeler, and I.C. Freestone, Pittsburgh, PA, Materials Research Society, 1992, p.981-988, 10 refs.

#### DLC CC135.M34 3rd 1992

The Australasian Antarctic Expedition base at Commonwealth Bay, also known as 'Mawson's Huts' include some of the earliest buildings in Antarctica. The prefabricated timber buildings of Oregon beams and Baltic Pine (*Pinus sylvestris*) claddings were erected in Jan. 1912 and were occupied for two years: they are thus approximately contemporary with the better known Scott and Shackleton huts near McMurdo Base in the Ross Sea. While the huts are of recent date, the rapid rate of deterioration due to the extreme climate means there is some urgency to developing a method of preserving the building. The timbers have been seriously corroded by snow particles carried in the katabatic winds which can exceed 300 km/hour, sometimes for days. The isolation of the site, accessible by sea for only three months of the year adds to the logistical difficulties. There has been considerable public debate in Australia about which method of preservation is appropriate. (Auth. mod.)

#### G-56623

Chatterjee, G.N., Agarwal, R.P., Tandon, V.K., Banerjee, B.K., **Clothing for Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.421-432, Refs. p.431-432.

#### DLC G850.I53 I53

The experience of the members of the Fifth Indian Expedition with clothing for antarctica, developed and supplied by the Indian Defence Research and Development organization, is described. The optimum requirements of clothing in Antarctica (at locations of Indian activities) are discussed. The clothing supplied has been found to meet their thermal protection needs during the antarctic winter adequately. (Auth. mod.)

#### G-56624

Vijayakar, S., **Fracture and fatigue studies on mild and structural steels for use in Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.433-441, 1 ref.

#### DLC G850.I53 I53

This study was intended to determine the usability of ordinary mild and structural steels in antarctic climatic conditions. An attempt was made to improve the fatigue and fracture toughness characteristics of such metals for the above use. The effect of hydrogen removal on the K<sub>pop</sub>-in value and the resulting fatigue crack growth rate and fatigue life of the metal specimen were determined. An improvement in pop-in characteristics has been found. (Auth.)

#### G-56625

Ramakrishnan, K.C., **Experiments on harnessing non-conventional energy sources in Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.445-453, 1 refs.

#### DLC G850.I53 I53

During the Fifth Indian Expedition to Antarctica, an experimental model of the Solar Photovoltaic (SPV) system designed and developed by the Bharat Heavy Electricals Limited was tested at Dakshin Gangotri Station and the Schirmacher Hills. This paper discusses the experimental results. Performance of the system was found to be better in Antarctica compared to that in India. Possible reasons for this, and the effect of albedo on the SPV system performance, is also discussed. Due to lack of data on the solar radiation components and other few meteorological parameters for the period of testing, the experimental results are mostly confined to qualitative analysis. A feasibility study for the wind energy conversion system was also carried out. (Auth. mod.)

#### G-56626

Banerjee, B.K., **Mineralising snow-melt water**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.457-464, 10 refs.

#### DLC G850.I53 I53

In Antarctica, due to poor thirst drive and lack of taste in the local freshwater, the water needs of the human body tend to get neglected. Synthetic mineral tablets were developed by the Defence Laboratory, Jodhpur to restore the taste to snowmelt water. The treated water was subjected to a practical user trial in Antarctica during the 5th expedition with favorable results. Most of the expedition members liked the taste of the mineralized water and found it satisfying. (Auth.)

#### G-56628

Sudhakar, T., **Communication system at Dakshin Gangotri, Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.467-472, 1 ref.

#### DLC G850.I53 I53

A reliable communication system at Dakshin Gangotri Station, where traditional equipments cannot function effectively due to long distances and peculiar weather and ionospheric conditions, is described. The satellite communication system is found to provide reliable and high quality telex, telephone and video communication, facilitating instantaneous contact over the entire world without much loss in the communication quality. The Satcom 'Hind' was put into operation after repairs in the hangar garage of the Station, as an alternative communication system, during the Fifth Indian Expedition to Antarctica. (Auth. mod.)



**G-56648**

Dhaulakhandi, A.B., Joshi, R.P., Joshi, M.C., **Optimisation of greenhouse climate and PAR at Maitri**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.187-193, 15 refs.

The optimization of greenhouse climate at Maitri Station is discussed. Strategies for controlling temperature, humidity, light and CO<sub>2</sub> concentration are described. Heating load has been estimated. July was the coldest month and required the most heating. Annual heating degree days at 25°C indoor temperature were 13277.3, while those for 20°C and 15°C indoor temperatures were 11452.3 and 9627.3, respectively. Annual heating loads at 25, 20 and 15°C indoor temperatures were 77038.56, 66449.04 and 55859.28 MJ, respectively. Monthly heating loads varied between 4424.88 and 8993.52 MJ at 25°C indoor temperature. (Auth. mod.)

**G-56656**

Chatterjee, P., **Fire protection - Indian stations at Antarctica: Maitri and Dakshin Gangotri hangar accommodations**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.283-291.

Fire is the greatest safety hazard in Antarctica because of the dry climate. The fire protection system at Maitri and Dakshin Gangotri stations has been evaluated and the weak points identified. Recommendations are made for safety of men and material; fire drills are proposed. (Auth.)

**G-56657**

Bhatia, S., **Report on R&DE(E) tasks during Tenth Antarctic Expedition**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.293-297.

As a part of an expansion program at Maitri Station, plans for certain additional facilities carried out during the 10th Indian expedition are described, and related tasks allotted to the members of the expedition are outlined.

**G-56758**

Gilles, P.E., Katan, J.R., Pease, B.L., **High frequency/automatic link establishment (HF/ALE) radio propagation test to Antarctica**, U.S. Naval Undersea Warfare Center Division. Technical report, Feb. 1, 1994, NUWC-NPT-TR-10427, 194p., ADA-277 730, 6 refs.

Recent federal/military standards in the area of automatic link establishment (ALE) for HF radios have been developed that coordinate frequency selection between communicating terminals, allowing them to adapt to skywave conditions. This study focused on evaluating the utility of these state-of-the-art radios in the polar environment. A quick-look evaluation of this technology was demonstrated over a radio circuit between Christchurch, New Zealand, and McMurdo Station. This transauroral link, operated by the U.S. Navy for the National Science Foundation, is the primary link for all operational, logistical, and emergency communications for U.S. operations between the Antarctic and the outside world. Daily plots of the measured signal-to-noise ratio, probability of bit error, and channel quality are presented, and analyzed. (Auth. mod.)

**G-56778**

Barthelemy, J.L., **Sea-ice runway near McMurdo Station, Antarctica: a problem of logistics**, International Offshore and Polar Engineering Conference, 6th, Los Angeles, CA, May 26-31, 1996 Proceedings. Vol.2. Edited by J.S. Chung, M. Sayed, R.E. Hobbs, and D.R. Yoerger, Golden, CO, International Society of Offshore and Polar Engineers (ISOPE), 1996, p.427-432, 5 refs.

**DLC TC1665.I5793a 6th V.2 1996**

The annual sea-ice runway at McMurdo Station allows heavy-haul wheeled aircraft to operate at the start of a short but vital re-supply season. A top priority of the United States Antarctic Program is to optimize research productivity by ushering scientists and equipment to the continent at the earliest possible date, thus a key operational objective is to extend usage of the seasonal runway for as long a period as is safe and reasonable. In the best of years, air operations are not relocated to a subordi-

nate ski facility until after the ice runway is abandoned because of progressive bottom melting and surface deterioration. During other years, however, the wheeled facility closes prematurely due to a failure at one of two vulnerable transition areas. The VXE-6 transition links the ice road that originates at the runway with the land-based road system around McMurdo Station proper. All priority cargo carried from the runway must cross this transition. The Williams Field transition occurs at the edge of the Ross Ice Shelf where annual sea ice abuts the glacial outcroppings. When the seasonal runway is closed, buildings are towed across the transition to a new location at the ski way. Failure of either of these two vital links is tantamount to failure of the runway itself. (Auth. mod.)

**G-57084**

Venzke, N.C., **Should the Coast Guard stay in the icebreaking business?**, U.S. Naval Institute. *Proceedings*, Dec. 1992, 118(12), p.97-98.

Discussions regarding the future of the Coast Guard's polar-icebreaker program have centered on the shortfall in construction funds for the planned third icebreaker—USCGC *Healy*. There are other matters deserving greater concern. The lack of a backup icebreaker has long been recognized as a weakness in antarctic operations. The danger is not having an icebreaker beset in McMurdo Sound; the concern is that, if an icebreaker is disabled, cargo vessels and tankers may not be able to unload their cargoes. Therefore, in PIR 1990, there is a U.S. Navy-specified operational requirement for a McMurdo Sound resupply backup icebreaker to be positioned within 14 days steaming of the base, along with 54-118 operating days annually. But while the idea of a backup icebreaker is a good one, it will work only if properly positioned and fully funded. So unless the Congress and the executive branch are serious about polar operations—and about paying for the substantial costs associated with them—the third icebreaker should not be built. (Auth.)

**G-57206**

Lang, R.M., Blaisdell, G.L., **Localized surface-ice weakness on a glacial ice runway**, *Journal of glaciology*, 1996, Vol.42, p.426-439, 16 refs.

Following construction of a glacial ice runway on the Ross Ice Shelf, and prior to flight operations, the runway was proof-rolled. The proof exercise was designed to simulate typical heavy aircraft. Initial testing produced numerous brittle surface failures in the runway ice. Thin sections of ice cores taken from the failed areas showed large crystals of clear, blue ice with long, vertical bubbles, indicative of ice formed directly from meltwater. Uniaxial unconfined compression tests on core samples were used to compare runway ice strength with published data for polycrystalline laboratory ice. Since the frequent failure of surface ice had not been expected, it was critical to understand the formation and mechanical properties of the weak ice to prevent its occurrence in the future and to strengthen the existing problem areas. Likely scenarios for development of weak ice on the airstrip and the physical properties of this type of ice are discussed. (Auth. mod.)

**G-57240**

U.S. National Science Foundation. Office of Polar Programs, Arlington, VA, **Headquarters oil spill response manual**, 1996, Var. p., Prepared by Jamestown Marine Services, Inc., Jamestown, RI, for NSF/OPP in Sep. 1995, revised by NSF in Oct. 1996.

Recognizing that fuel spills represent the single greatest threat to the antarctic environment, the National Science Foundation, Office of Polar Programs (NSF/OPP) initiated the Oil Spill Prevention and Response Plan Project in Sep. 1990. The project is in direct support of the OPP's *Environmental Protection Agenda* Oil Spill Prevention Action Item and the NSF Office of General Counsel's *Strategy for Compliance with Environmental Law in Antarctica*. The project has developed several oil spill response contingency plans in accordance with guidance prepared under the direction of the Standing Committee on Antarctic Logistics and Operations (SCALOP) by the SCALOP subgroup on Oil Spill Prevention and Response and approved by the Council of Managers, National Antarctic Programs (COMNAP). The spill response contingency plans are complemented by a comprehensive *USAP Spill Prevention, Control and Countermeasures Plan (SPCC)*. This manual provides guidance to the Headquarters Emergency Management and Response Team (HEMART) to support facility and area response actions. Oil spills, no matter how small, must be reported and cleaned up. (Auth. mod.)



**G-57250**

Kiuchi, H., **Highly stable crystal oscillator applied to the VLBI reference clock**, *IEEE transactions on instrumentation and measurement*, Feb. 1996, 45(1), p.177-183, 15 refs.

Instead of the hydrogen maser, a carefully selected crystal oscillator which is phase locked to a cesium frequency standard for 100-second time scales was adopted to the time and frequency standard of a geodetic VLBI experiment. The frequency stability of the integrated frequency standard system is poorer than that of the normally used hydrogen maser, but the overall results of geodetic VLBI measurements are comparable to those obtained from the normal experiments, provided a properly designed observation schedule is used. VLBI experiments were carried out for four years from 1988 using this system at one of the 1000 km baselines. The first VLBI experiment using this system on the 11,000 km baseline between Japan and Antarctica was carried out successfully in Jan. 1990. (Auth. mod.)

**G-57287**

Guichard, A., Magill, P., Godon, P., Lyons, D., Brown, C., **Exploiting wind power in Antarctica**, Sandy Bay, Tasmania, Latitude Technologies, 1995, 15p., With French summary. 10 refs. Paper presented at the 1995 Conference of the Australian and New Zealand Solar Energy Society, "Solar'95", Hobart, Tasmania, Australia, Nov. 29-Dec. 1, 1995.

In the 1950s and 60s, the remote and inhospitable antarctic region saw the establishment of many scientific stations. These scientific stations require highly reliable continuous power to ensure both the continuity of scientific activities and a suitable level of comfort for the expeditioners. Engineers have always turned their minds to the use of renewable energy at the stations and, because of the high winds generally experienced, wind power was always felt to be the most promising solution. But the early expeditions encountered reliability problems with wind turbines and found that conventional generator sets and boilers were the only satisfactory, practical answer to the reliable provision of the energy required at the stations. Although continually improved, the present energy systems still rely on the same basic principles. In recent times, environmental and logistic concerns have provided an incentive for a move away from the reliance on imported fuels to using renewables. Preliminary studies conducted in the framework of a cooperative French-Australian Project have identified wind power as the most promising solution for immediate implementation at the two nations' stations. This paper outlines the wind characteristics at several stations, and after discussing the availability of suitable wind turbines, looks at the power generation potential of selected turbines at these stations.

**G-57288**

Guichard, A., Magill, P., Godon, P., Lyons, D., Brown, C., **Potential for significant wind power generation at antarctic stations**, Sandy Bay, Tasmania, Latitude Technologies, 1996, 10p., With French summary. 14 refs. Paper presented at the 7th Symposium on Antarctic Logistics and Operations, Cambridge, England, Aug. 6-7, 1996.

The antarctic scientific stations are generally powered by conventional diesel boilers and generator sets which consume large amounts of fossil fuels. In addition to being difficult and expensive to ship, fuel can threaten the local environment. The potential for wind power generation is high, but few commercial wind turbines can resist the harsh local conditions. The 10 kW "UM70X/GEV7.10" turbine was identified as the most suitable unit currently available. Its production potential was assessed and used as a basis for analyzing several configurations of wind-diesel systems at the stations. At some stations where conditions have been found to be favorable, modest investments in wind turbines would make significant contributions to the overall station energy requirements, while larger, more ambitious systems could make the stations nearly independent of fossil fuels.

**G-57317**

Potapenko, V.IU., Savatiugin, L.M., **Review of experimental investigations on the construction of an artificial ice mooring in the region of Molodezhnaya AMC (Antarctic Meteorological Centre)** [Obzor eksperimental'nykh issledovaniy po sozdaniyu iskusstvennogo ledianogo prichala v raione AMTs Molodezh-

naia], *Rossiiskaia Antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No.117, p.68-72, In Russian.

This review covers practical investigations carried out between 1984 and 1990. The main findings were as follows: fresh water produces ice of higher density and freezes faster than salt water; blocks of ready cut sea ice can be frozen into position with fresh water; ice should be frozen in layers, as at temperatures over -20°C other methods do not give sufficient density; surfaces above the waterline need thermo-friction protection, and the area around the mooring must be capable of carrying transport vehicles. By combining these methods, an ice mooring was successfully built for the *Akademik Fedorov* in 1990.

**G-57318**

Potapenko, V.IU., Savatiugin, L.M., Chekhovskikh, A.L., **Predicting the thermophysical condition of an ice mooring near the Molodezhnaya AMC (Antarctic Meteorological Centre)** [Prognoz teplofizicheskogo sostoiianiia ledianogo prichala v raione AMTs Molodezhnaia], *Rossiiskaia Antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No.117, p.72-79, In Russian. 2 refs.

The formula is given for calculating the temperature field of an ice mooring by means of a linear differential equalization of heat conductivity which can be used in predicting the temperature field during the critical warm months. The authors recommend the following measures to increase the life of ice moorings: Thermal insulation of the walls from the effects of sea water should be installed during first construction; the upper surfaces should be insulated at the end of winter by covering them with hydro-insulating film; and two rows of refrigerating columns should be inserted vertically along the walls of the ice mooring. Figures show the recommended position of refrigerating columns, and the temperature field of the walls of a thermally insulated ice mooring in summer.

**G-57400**

U.S. Naval Support Force Antarctica, **End of season report: Operation Deep Freeze 96/97**, May 1997, var. p.

This report describes the military support to the United States Antarctic Program (USAP) from Aug. 1996 to Mar. 1997 as Operation Deep Freeze 96/97. Support was provided by the Departments of Defense and Transportation under the operational control of Commander, U.S. Naval Support Force, Antarctica. The Naval Support Force Antarctica (NSFA) provided command and control facilities and medical services to McMurdo Station residents and the logistic and communications pipeline for resupply of the Terra Nova Bay Station and the Vostok Station. This report provides a summary of significant events during the operating period. The various organizations, units, and commands participating in Operation Deep Freeze 96/97 are listed, and their activities and recommendations are described.

**G-57464**

Walsh, M.R., ed, **South Pole Tunneling System. Operation and maintenance manuals. Volume 1: general equipment description, set-up, operation, and maintenance**, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, Mar. 1997, 41p., Prepared for the U.S. National Science Foundation, Division of Polar Programs, and Antarctic Support Associates.

This is Vol.1 of 4 volumes of manuals for the South Pole Tunneling System (SPoTs), a system to excavate unlined tunnels beneath the snow for use as utility corridors or personnel passageways. The tunneling system was first deployed in Jan. 1996 at the Amundsen-Scott Station. Work was suspended for the season and then resumed in Nov. 1996 when a 400'-long, 6'-wide by 10'-high unlined tunnel 43' below the snow surface, for the station's wastewater facility, was completed. The tunnel is a modified Bobcat Model 231 tracked mini-excavator with the dipper stick and bucket removed and replaced with a hydraulically-powered horizontal cutter drum 6' wide by 2' in diameter. The cutter drum is positioned horizontally across the width of the tunnel at right angles to the side walls during excavation, but can be rotated to a vertical position to mill the side walls. The excavated snow is transported through a series of telescoping and flexible ducts to a snow blower on the surface.

**G-57465**

Arnold, T.W., Morse, J.S., Williams, C.R., **South Pole Tunneling**



**System. Operation and maintenance manuals. Volume 2: electrical and electronic systems manual**, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, Mar. 1997, Var. p.

This is Vol.2 of 4 volumes of manuals for the South Pole Tunneling System. This volume includes specifications, block diagrams, schematics, and manufacturers' manuals for the electrical and electronic systems. The equipment covered includes the motor systems; soft starter; electronic controls, installation and operation of the caterpillar generator set (genset); control cab and boom inclinometer; temperature controller; heaters; and laser leveler. Also included are 32 color photographs of the equipment.

#### G-57466

Walsh, M.R., **South Pole Tunneling System. Operation and maintenance manuals. Volume 3: hydraulic and mechanical systems manual**, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, Mar. 1997, 268p.

This is Vol.3 of 4 volumes of manuals for the South Pole Tunneling System. This volume includes specifications, block diagrams, schematics, and manufacturers' manuals for the hydraulic and mechanical power control and transmission systems of the tunneler and snow blower. Equipment covered in detail includes motors, pumps, valves, hydraulic oil, and gear-boxes. Also included are a number of color photographs passim of the equipment.

#### G-57467

Walsh, M.R., Arnold, T.W., Lambert, D.J., Morse, J.S., Williams, C.R., **South Pole Tunneling System. Operation and maintenance manuals. Volume 4: operator's manual**, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, Mar. 1997, 51p.

This is Vol.4 of 4 volumes of manuals for the South Pole Tunneling System. This volume is the operator's manual for the entire tunneling system. Operations covered include controls, starting, machining adjustments, laser alignment, maintenance, and shutdown of the tunneler; operation and configuration of the ducts, transition sled, and snow blower for the snow chip removal system; operation and safety procedures for the drill rig for drilling vertical access holes to the tunnel (the drill rig is particularly dangerous and can be life threatening if not handled properly); and the startup, operation, monitoring, and shutdown of the generator set.

#### G-57472

Pathak, R.C., **Constructional and environmental aspects of structural materials at Antarctica and Indian Himalayas**, Materials Engineering Conference, 4th, Washington, D.C., Nov.10-14, 1996. Proceedings. Vol.2. Materials for the new millennium, edited by K.P. Chong, New York, ASCE, 1996, p.968-977, 12 refs.

#### DLC TA401.3.M3762 1996

The author had participated in the 9th Indian Antarctic Expedition in 1989-90 and was involved in the construction of the experimental greenhouse at the Maitri Station as a civil engineer. He describes the experiences gained in Antarctica, as well as those gained in the western Himalayas, through studies of geocryology and geotechnical and structural aspects of various types of modular shelters, vehicle sheds, etc. He concludes that the conventional construction materials and techniques do not meet all the desired requisites in such extremely cold environments and that there is a need to devise special construction materials for those conditions. (Auth. mod.)

#### G-57560

Blake, D.M., **Development of structures for Halley Station in Antarctica**, International Symposium on Cold Region Development, 5th, Anchorage, AK, May 4-10, 1997. ISCORD '97. Edited by H.K. Zubeck, C.R. Woolard, D.M. White, and T.S. Vinson, New York, American Society of Civil Engineers, 1997, p.57-60, 4 refs.

Halley 5, the 5th station to be built on the Brunt Ice Shelf, Coats Land, has accommodation, laboratory, and workshop buildings erected on jackable platforms to overcome the effects of an annual snow accumulation of approximately 1.5 m. Halley 5 was begun in the summer 1988-1989 and

was put into operation in winter 1992. It consists of 3 jackable platforms at the points of an equilateral triangle 300 m apart, service tunnels, and a relocatable ski-mounted garage. The jackable platforms house the Accommodation Building (ACB) with workshops and living quarters for 30 people, and two smaller laboratory buildings. The legs of the platforms can be jacked up at about 40 cm/day when necessary to allow the snow to drift beneath the buildings. Future structures are planned to be built above ground since they are more accessible and easier to modify than those buried under the snow. The success of the ski-mounted garage prompted the deployment of another 30-person, ski-mounted accommodation module during the 1994-95 season.

#### G-57561

Hannuki, T., Sano, M., Ayukawa, M., Ishizawa, K., **Wind-induced vibration of the central building of Syowa Station in Antarctica**, International Symposium on Cold Region Development, 5th, Anchorage, AK, May 4-10, 1997. ISCORD '97. Edited by H.K. Zubeck, C.R. Woolard, D.M. White, and T.S. Vinson, New York, American Society of Civil Engineers, 1997, p.65-68, 1 ref.

A new central building for living quarters and administration, consisting of three stories, was built from 1991 to 1993 at Showa Station. The first floor was elevated and smaller in area than the second floor to reduce snowdrifts around the building, but with the second story extending over the first story, the shape subjected the building to severe vibrations from the wind. In 1995, the building was reinforced with exterior steel trusses supporting each of the cantilever ends of the second floor, and wind-induced vibrations were effectively reduced.

#### G-57562

Guichard, A., Lyons, D., Magill, P., Godon, P., **Potential for significant wind energy utilisation at antarctic stations**, International Symposium on Cold Region Development, 5th, Anchorage, AK, May 4-10, 1997. ISCORD '97. Edited by H.K. Zubeck, C.R. Woolard, D.M. White, and T.S. Vinson, New York, American Society of Civil Engineers, 1997, p.293-296, 5 refs.

A cooperative French-Australian project is evaluating the possibilities of, and developing plans for replacing diesel generators with wind power turbines at their antarctic stations. The turbines must be large enough to supply the necessary power requirements but small enough so their rotors will not be overstressed by the high winds. A promising machine is the Lagerwey LW18/80. Though smaller, the Vergnet GEV 7.10 has also shown some success. Wind turbines may not be able to supply 100% of the power needs of all stations and totally replace diesel generators, so some intermittent use of diesel generators may still be necessary. For now it is unrealistic to expect a wind turbine that could supply several hundred kW and also resist the highest wind speeds (90 m/s or 324 km/h measured at Dumont d'Urville Station), but wind-resistant, medium-sized wind turbines could meet a significant proportion of the power required by the stations.

#### G-57563

Flynn, M.T., Bubenheim, D., **Controlled Ecological Life Support System Antarctic Analog Project: waste treatment technology development for use at the Amundsen-Scott South Pole Station**, International Symposium on Cold Region Development, 5th, Anchorage, AK, May 4-10, 1997. ISCORD '97. Edited by H.K. Zubeck, C.R. Woolard, D.M. White, and T.S. Vinson, New York, American Society of Civil Engineers, 1997, p.649-652.

The Controlled Ecological Life Support System (CELSS) Antarctic Analog Project (CAAP) is a joint endeavor between the National Science Foundation, Office of Polar Programs (NSF-OPP) and the National Aeronautics and Space Administration (NASA). Its fundamental objective is to develop, deploy and operate a testbed of NASA Life Support technologies at the Amundsen-Scott South Pole Station. The CAAP program will attempt to provide in situ food and waste treatment facilities to winter-over personnel. Waste water is distilled. Solid wastes in the water provide nutrients for hydroponically grown vegetables. Water transpired from the vegetables provide potable water and the vegetables themselves provide food for the personnel. The CELSS may provide an analog for future space flights. (Auth. mod.)



**G-57647**

Swithinkbank, C., **New intercontinental air route: Cape Town to Antarctica**, *Polar record*, July 1997, 33(186), p.243-244.

Polar Logistics, a company specializing in high-latitude cargo/passenger services, has begun direct flights between Cape Town and an ice runway in Queen Maud Land. The company employs a Lockheed Hercules L-382G for the 4230 km flight, which takes around 9 hours. Following a successful proving flight on Dec. 12, 1996, the first passenger/cargo flight took place a week later. The initial flights have demonstrated the feasibility of carrying useful loads on direct flights from Cape Town to a range of destinations in Antarctica.

**G-57648**

Splettstoesser, J.F., Headland, R.K., Todd, F., **First circumnavigation of Antarctica by tourist ship**, *Polar record*, July 1997, 33(186), p.244-245, 3 refs.

The Russian icebreaker *Kapitan Khlebnikov* completed the 10th circumnavigation of Antarctica during the 1996-97 austral summer, starting in Port Stanley, Falkland Is., on Nov. 24, 1996 and travelling eastward around the continent before returning to the same port on Jan. 27, 1997. The ship carried 66 passengers and 27 staff for the first adventure travel voyage of its type, and visited several scientific research stations that had never received tourist visits previously. Some of the stations had not had any visits since their wintering period began. A complete list of stops is given in a table.

**G-57776**

Crockett, A.B., **Water and wastewater quality monitoring, McMurdo Station, Antarctica**, *Environmental monitoring and assessment*, Aug. 1997, 47(1), p.39-57, 17 refs.

Wastewater from McMurdo Station, which has a population that ranges from 250 to 1200 people, is macerated, is sometimes mixed with waste brine from the desalinization plant and is discharged to McMurdo Sound. Effluent water quality has been routinely monitored since 1989. Results of the effluent monitoring efforts show that low concentrations of a few organic contaminants have been detected, while concentrations of metals, particularly copper, are considerably higher. Ambient water quality and sea ice monitoring detected very few contaminants, all at very low levels. Diatom communities near the outfall differ in relative abundance, cell counts, and chlorophyll *a* content compared to control sites. For the purpose of evaluating the impact of McMurdo's effluent on ambient water quality, improved effluent monitoring and sediment quality monitoring are recommended instead of frequent monitoring of ambient water quality. (Auth. mod.)

**G-57854**

Moroño, S., González, E., Ramos, M., **Environmental data-transmission network** [Red de transmisión de datos para aplicaciones medioambientales], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.429-438, In Spanish with English summary. 6 refs.

The development of a network for transmission of ecological and geomorphological data in Antarctica is reported. The aim is to monitor by remote control, and register the evolution, of environmental parameters acquired at a number of sampling points in the target area. Characteristics of the network are described and the design of its central unit is explained and illustrated. (Auth. mod.)

**G-57855**

Ramos, M., Relinque, J.I., **Accumulators as a source of electric power supply for automatic recording systems** [Comportamiento de acumuladores como fuente de energía eléctrica para la alimentación de sistemas automáticos de registro], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.439-454, In Spanish with English summary. 9 refs.

Results are presented of experimental studies carried out at the Juan Carlos I Station of the performance, at very low discharge intensity (0.005°C), of different types of batteries operating in 0°C to -35°C temperatures designed to supply electrical power to automatic recording systems. The equipment tested is described and its installation is illustrated and discussed.

**G-57856**

Ramos, M., Mora, M., **Performance of batteries at low discharge intensity and low temperatures** [Comportamiento de baterías primarias en descargas lentas a bajas temperaturas], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.455-467, In Spanish with English summary. 6 refs.

This paper describes an experimental study of the performance, at very low discharge intensity and low temperature conditions, of different commercial batteries (primary cells), such as zinc, alkaline and lithium, as these conditions are representative of most of the data acquisition in Antarctica.

**G-57857**

Ramos, M., Mora, M., **Secondary accumulator charge performance in low temperatures** [Comportamiento de carga a bajas temperaturas en acumuladores secundarios], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.469-475, In Spanish with English summary. 6 refs.

Experimental studies were carried out at Juan Carlos I Station to obtain charge performance diagrams for different secondary cell accumulators (alkaline, lead, sealed lead) at low temperatures. Based on these diagrams, the parameters characterizing the charge processes in the equipment tested are determined. It is concluded that all technologies, except the alkaline, are close to useless in temperatures below -20°C.

**G-57858**

Ramos, M., Solla, A.L., **Humidity transducers used for polar clothing** [Transductor capacitivo para la medida de la humedad aplicado al estudio del comportamiento de trajes polares], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.477-484, In Spanish with English summary. 4 refs.

Experimental studies of transpirational properties of polar clothing are reported. The design and calibration of an instrument for measuring the relative humidity trapped in the garments are described in detail.

**G-57859**

Ramos Sainz, M., **Effects of evapotranspiration on the insulation properties of polar clothing** [Influencia del vapor de transpiración en las características aislantes de un abrigo polar], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.485-500, In Spanish with English summary. 7 refs.

The thermodynamic parameters (temperature distribution, thermal conductivity, transpiration) have been measured in a polar garment by two different operating modes: the activated and non-activated Interlayer Ventilation System (IVS). The experiments show that the IVS improves human comfort in polar condition.

**G-57883**

Barabanov, N.V., Moskalenko, A., Lapin, E., **On the damage of skeg and steering gear of the M/V "Stepan Krashenninikov"**



**in the antarctic ice**, International Offshore and Polar Engineering Conference, 7th, Honolulu, May 25-30, 1997. Proceedings. Vol.2. Edited by J.S. Chung, R.M.W. Frederking, H. Saeki, and A.T. Bekker, Golden, CO, International Society of Offshore and Polar Engineers (ISOPE), 1997, p.521-522.

On Feb. 28, 1994, the MV *Stepan Krashennikov* was damaged by cracks in its rudder and skeg caused by ice while it was operating in the Lazarev Sea close to the coast of Antarctica. It managed to make it back to Durban, South Africa, under its own power, where it was repaired.

#### G-57884

Barthelemy, J.L., **Landing and parking curves for the C-17 Globemaster on sea ice: McMurdo Station, Antarctica**, International Offshore and Polar Engineering Conference, 7th, Honolulu, May 25-30, 1997. Proceedings. Vol.2. Edited by J.S. Chung, R.M.W. Frederking, H. Saeki, and A.T. Bekker, Golden, CO, International Society of Offshore and Polar Engineers (ISOPE), 1997, p.523-528, 5 refs.

The United States Antarctic Program operates a seasonal sea-ice runway at McMurdo Station that supports heavy-haul wheeled aircraft during the short but vital resupply window. The Naval Facilities Engineering Service Center provides criteria to the National Science Foundation for the safe operation of these aircraft. During 1996, landing and parking curves were developed for the newest Air Force transport, the C-17 Globemaster, which had been scheduled tentatively for service in Antarctica in the month of Oct. 1996. Although this new transport weighs somewhat less than the C-5 Galaxy it is scheduled to replace, the C-17 also has just half as many wheels, and leaves correspondingly heavier footprints on the ice. In spite of somewhat greater localized stresses around the landing gear, the thickness of sea ice grown during the "typical" antarctic winter is sufficient to support the maximum aircraft weight of 2.6 MN on landing, take-off and during turnaround parking. (Auth.)

#### G-57885

Blaisdell, G.L., Richmond, P.W., Kaiser, F.C., Alger, R.G., **Development of a modern heavy-haul traverse for Antarctica**, International Offshore and Polar Engineering Conference, 7th, Honolulu, May 25-30, 1997. Proceedings. Vol.2. Edited by J.S. Chung, R.M.W. Frederking, H. Saeki, and A.T. Bekker, Golden, CO, International Society of Offshore and Polar Engineers (ISOPE), 1997, p.529-536, 5 refs.

An integrated, interdisciplinary study was completed to assess the feasibility of an oversnow route from McMurdo to the Amundsen-Scott Station. Currently the only means of supplying the Amundsen-Scott Station is by specialized aircraft. Air photo and satellite imagery were used extensively, along with ground-penetrating impulse radar (deployed from a helicopter) to make preliminary determinations of the suitability of glaciers in the Transantarctic Mountains for heavy tractor access from the Ross Ice Shelf to the polar plateau. These were followed by ground reconnaissance and data gathering. Modern traverse equipment was also developed and tested as part of this study. Tractor performance and terrain information were used to compare two potential traverse routes and to calculate delivered payload, fuel consumption, and travel time. (Auth.)

#### G-57886

Chiang, E., Chang, S.C., Brown, A.J., **Pollution abatement at McMurdo Station, Antarctica**, International Offshore and Polar Engineering Conference, 7th, Honolulu, May 25-30, 1997. Proceedings. Vol.2. Edited by J.S. Chung, R.M.W. Frederking, H. Saeki, and A.T. Bekker, Golden, CO, International Society of Offshore and Polar Engineers (ISOPE), 1997, p.572-578, 10 refs.

The soil and marine sediment of McMurdo Station, the logistical hub of the U.S. Antarctic Program, are contaminated by both petroleum hydrocarbons and the residual products of waste disposal. These contaminants were released to the environment during earlier years of expeditionary operations. Since 1987, the National Science Foundation has initiated a number of measures in pollution abatement to correct past abuses and to protect the antarctic environment. These measures include promulgation of waste regulations, development and implementation of a waste management program, cleanup of the station waste dump sites, and development of spill prevention and spill response plans. (Auth.)

#### G-57935

Yoshino, T., **Short history of EMC technology applied in Japanese Antarctic Research Expedition (research note)**, NIPR Symposium on Upper Atmosphere Physics, Proceedings. No. 10, Tokyo, National Institute of Polar Research, Jan. 1997, p.126-130.

The construction of the main power plant at Showa Station in 1959, including the installation of a diesel electric generator of 40 kW, 3-phase, 100 and 200 V, is described. Details of the grounding problems related to strong EMC obstructions, and how they were solved, are given. The electrical grounding systems for 1959, 1976 and modern grounding systems for analog circuits and digital circuits, are illustrated.

#### G-57964

Ward, J.P., Peck, L.S., **Coldwater marine aquarium at the British Antarctic Survey**, *Aquarium sciences and conservation*, Mar. 1997, 1(1), p.53-63, 15 refs.

At the British Antarctic Survey, a completely new aquarium system was designed and constructed in 1988 to provide a cold-water environment for holding a variety of antarctic fishes and invertebrates. The philosophy behind the new antarctic aquarium is to provide a controlled environment in a system that is simple to maintain. One of the most important environmental conditions is the provision of a continuous low air temperature and controlled sea water temperature, to facilitate the transfer of specimens between holding and research facilities without there being a significant difference between air and water temperatures. In this way specimens are freed from the dangers of temperature stress. This paper describes how these conditions have been established. It outlines the design, construction and operation of the BAS Marine Aquarium. (Auth. mod.)

#### G-57993

Triebfürst, B., Schneider, C., Wunderle, S., Saurer, H., Gossmann, H., **Compression of spaceborne SAR images**, *ITC journal*, 1996(Pub. 1997), Nos. 3/4, p.225-229, With French and Spanish summaries. 12 refs.

Various data compression algorithms have been developed recently, mainly for the purpose of transferring optical or photographic images within telecommunication networks. These algorithms are about to become valuable tools in the field of remote sensing because full resolution and retention of data are not always necessary to evaluate multisensoral images or time series of images. In this study, a subset from an ERS-1-PRI image of parts of the Antarctic Peninsula was used to test a fractal encoding procedure, a wavelet encoder and the joint photographic expert group (JPEG) standard for image compression. The peak-signal-to-noise-ratio (PSNR) at any compression rate turned out to be best for the wavelet encoder. The change in information content after compressing the original data at a ratio of 50:1 was interpreted visually for the fractal encoder and the wavelet algorithm. The wavelet encoder returned the best overall results, while retaining most relevant features in the image. (Auth. mod.)

#### G-58137

Fukushima, I., Kubo, E., **Snow noise disturbance in antarctic radio communications and development of mobile antenna for snow vehicle in Antarctica**, *Antarctic record*, July 1997, 41(2), p.513-536, In Japanese with English summary. 15 refs.

Radio operators of the Japanese Antarctic Research Expedition (JARE) have encountered critical radio noise disturbances caused by blizzards during oversnow travel. This noise appears to be caused by corona discharge at the edges of the vertical whip antenna. This paper describes several examples of snow noise experienced in Antarctica by JARE, the mechanism of generation of the noise, and a method of reducing the intensity of the noise. It also describes a High Efficiency Transmission Line Antenna which is small enough to mount on a snow vehicle and reduces the intensity of the snow noise. (Auth.)

#### G-58138

Watanabe, O., **Activities of the summer party of the 35th Japanese Antarctic Research Expedition in 1993-1994**, *Antarctic record*, July 1997, 41(2), p.537-548, In Japanese with English summary.



The 35th Japanese Antarctic Research Expedition (JARE-35) consisted of 40 wintering members and 16 summer members plus 3 foreign scientists from the U.S.A. and Australia. The icebreaker *Shirase* left Tokyo on Nov. 14, 1993, and arrived at the pack ice edge near Lützow-Holm Bay on Dec. 17. Due to unusually severe sea ice conditions, continuous icebreaking began at this point, and continued until the *Shirase* was stalled 10 nautical miles from Showa Station. At this point, the expedition stores were transferred to Showa Station by helicopter airlift and snow vehicle through sea ice routes. These operations transported more than 96% of the total expedition baggage. Observations of physical and chemical oceanography, marine biology and earth sciences were carried out. (Auth. mod.)

**G-58154**

U.S. Naval Support Force Antarctica, **Operation Order 201.**

**"Operation Deep Freeze". Specific annual seasons are indicated by suffix yr/yr, i.e. 97/98, Aug. 1997, var. p.**

This Operation Order provides basic guidance for the conduct of "Operation Deep Freeze" 97/98, the annual U.S. Department of Defense operational and logistic support for the United States Antarctic Program (USAP). It lists 11 Annexes, including air and ship operations, logistics, administration, medical/dental services and requirements, field operations and communications. Eleven Appendices include air and ship operation schedules, scientific programs, communications plan, uniform standards and requirements, and a distribution list.

See also:

A-56680 A-57095 A-57096 A-57524 A-58163 A-58164 B-56511  
B-56629 B-56701 B-57489 B-57618 B-57863 B-58223 E-56546  
F-56479 F-56569 F-56663 F-57316 F-57319 F-57323 F-57512  
F-57992 F-58203 H-56398 I-56536 I-56612 I-56660 I-56824  
J-57888 K-56827 K-57569 L-56547 L-57771 M-57386



## H. MEDICAL SCIENCES

### H-56398

Courington, R., **Stress as an obstacle to normal function**, U.S. National Science Foundation/American Institute of Architecture Students. Student monograph competition. Environment 2: a new town for science, Washington, D.C., May 1993, p.77-83, 9 refs.

This paper addresses fundamental problems related to the ability of man to function normally in the intensely alien environment of Antarctica. An alien environment pushes the adaptive capacity to, and even past, its limits. Adaptation is a function of a partnership between two physical systems, the neurological system and the endocrine system. This combined system, the neuroendocrine system, enables us to adapt to small changes in the environment, and has a close relationship with the immune system. The most important factors influencing the neuroendocrine system are discussed; light, smell, sound, visual vistas, group size, community organization, privacy, recreation, wind, plants, and pets. (Auth. mod.)

### H-56552

Majumdar, D., Purkayastha, S.S., Selvamurthy, W., **Body weight and skinfold thickness in Antarctica**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.259-268, 16 refs.

Body weight and skinfold thickness at 11 different sites of 18 men of the 9th Indian Expedition to Antarctica were measured during a period of 14 months (Dec. '89 to Jan. '91) at Maitri Station. Group mean body weight and mean skinfold thickness increased significantly throughout the stay. Maximum increase of mean body weight was 6.14 kg in Nov. '90. Increase of skinfold thickness was maximum at the abdomen (17.0 mm), followed by mid-axilla (15.0 mm), juxtanipple (10.1 mm), suprailliac (9.7 mm) and subscapular (9.3 mm) points. Mean increase of body weight showed positive correlation with the various skinfold thicknesses in each month. Body weight was significantly correlated to the abdomen, juxtanipple, suprailliac and mid-axillary skinfold thickness. Much of the fat deposition occurred around the abdomen, chest and back of the subjects. The data could be used for designing an exercise schedule to keep the members fit and productive during long-term stays in Antarctica. (Auth. mod.)

### H-56553

Singh, R., **Impact of antarctic environment on the reproductive physiology and immunity**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.269-273, 8 refs.

Changes in hormonal levels and immune system of human subjects were studied during and after acclimatization in Antarctica. Blood samples were collected and plasma separated and preserved at -20°C. No significant changes were found in the percentage of various cell types and total number of lymphocytes after one month from the start of the expedition. There was a relative decrease in the number of total lymphocytes and various cell types 3 months after arrival in Antarctica. The levels of hormones like TSH, PRL and Cortisol were not found to change after a stay of 3 months, but there was a significant increase in the levels of luteinizing hormone and there was relative increase in the levels of FSH. The levels of male hormone testosterone were found lower than the control in the last months of stay in Antarctica. This study shows that there are important implications of the effects of antarctic environment on various parameters of human health. (Auth. mod.)

### H-56653

Sachdeva, U., Naidu, M., Chhajera, B., Karmarkar, M.G., Sundaresan, G., **Hormonal profile of human subjects exposed to antarctic summer**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.251-259, 10 refs.

The harsh challenging and extreme photoperiodic environment of Antarctica provides an ideal setting for studies of many human physiological and psychological variables. Of particular interest is the possibility of hormonal changes as one of the causative factors for these variations. A pilot study was conducted on summer expedition members to determine the hormonal profile of peripheral blood. The data suggest increased levels of prolactin and growth hormone, and decreased levels of cortisol, triiodothyronine and thyroxine. (Auth.)

### H-56654

Sachdeva, U., Naidu, M., Sundaresan, G., **Thermal acclimatization to cold in men exposed to antarctic environment during summer**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.261-269, 11 refs.

The finger skin temperature (T<sub>sk</sub>) and blood flow (FBF) alterations before and after cold immersion on exposure to antarctic environment for 8 weeks were studied in 64 subjects. Cold immersion test was performed in non-antarctic and antarctic conditions by immersing the hand for 2 min in 0-4°C cold water. Data indicate that continuous cold exposure in Antarctica results in vasodilatation which overrides the stronger vasoactive response of acute cold exposure, thereby preventing cold injuries. Besides this circulatory acclimatization to cold, there was an increase in body mass associated with redistribution of subcutaneous fats. (Auth.)

### H-56655

Sachdeva, U., Naidu, M., Chhajera, B., **Evaluation of physical activity on exposure to antarctic environment**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.271-281, 14 refs.

A study was conducted to analyze the mechanisms of decreased performance of 17 subjects in Antarctica using the step test. The heart rate (HR), blood pressure (BP), oral temperature (T<sub>o</sub>) and skin temperature (T<sub>sk</sub>) were determined before and after exercise. Two recordings were taken: basal on the ship, and the other 8 weeks after arrival in Antarctica. A cold chamber simulation study was conducted on rats to determine if cold exposure alone is the primary factor affecting the physical performance. A significant reduction in Physical Fitness Index (PFI) was observed in men after their antarctic stay. Whereas in rats, there was an improvement after acclimatization. The "Hypodynamia" was more marked than anticipated in human subjects. It is concluded that exposure alone cannot be the sole contributing factor. (Auth. mod.)

### H-56688

Pitson, G.A., Lugg, D.J., Muller, H.K., **Seasonal cutaneous immune responses in an Antarctic wintering group: no association with testosterone, vitamin D metabolite or anxiety score**, *Arctic medical research*, July 1996, 55(2), p.118-122, 16 refs.

Immune function is modulated by a complex set of neuroendocrine factors including sex hormones, vitamin D metabolites and stress. Antarctic expeditioners exhibit reduced cell mediated immunity. Studies have also shown a reduction in testosterone levels in wintering expeditioners and suggested a correlation between levels of anxiety and reduced immune function in brief trip expeditioners. Nineteen male antarctic expeditioners were followed by 3 monthly assessments of cell mediated immunity, levels of testosterone and vitamin D metabolite and psychological indicators of anxiety. There was a significant reduction in immune function during the study period, consistent with previous antarctic studies. Levels of testosterone, anxiety and the immunoregulatory metabolite of vitamin D did not alter significantly. In this group the reduction in immune function did not show a correlation with levels of anxiety or the hormones studied. (Auth.)



**H-56923**

Stroud, M., **Nutrition across Antarctica**, *Nutrition bulletin*, Sep. 1994, 19(72), p.149-155, 12 refs.

During the southern summer of 1992-93, 2 men set out from the Atlantic coast of the Antarctic, aiming to perform the first crossing of the continent unaided by other men, animals or machines. Behind them, they each towed sledges weighing 222 kg which contained 100 days of food, fuel and essential survival equipment. Their diet, physical activity, body weight and composition, pre- and post expedition, are discussed.

**H-56965**

Xu, S.H., Jin, S.M., Si, Q., Xue, Z.H., Wang, Z.H., Xue, Q.F., **Effects of residing in Antarctica on plasma tryptophan and urinary 5-hydroxy-3-indoleacetic acid in expedition members**, *Antarctic Research (Chinese edition)*, Dec. 1996, 8(4), p.68-71, In Chinese with English summary. 10 refs.

In order to study the possible relationship between the changes of behavior/personality and metabolic changes of 5-hydroxytryptamine (5-HT) in antarctic expedition members, plasma tryptophan (Trp) and urinary 5-hydroxy-3-indoleacetic acid (5-HIAA) were studied in 43 members of the 8th and the 11th expedition. Results showed that plasma Trp decreased significantly after 1-3 months stay at the Great Wall Station, and did not recover on leaving Antarctica. Urinary 5-HIAA increased significantly after 6 months' stay at the Great Wall Station, and recovered after returning to Beijing. The decrease of plasma Trp may relate to the decline of brain 5-HT, which might play a role in the changes of behavior/personality. The changes of urinary 5-HIAA might not only reflect metabolic changes of 5-HT, but also show that cold weather affects the releasing platelet response. It is concluded that supplements of related food rich in Trp, or intervention of L-Trp, might be needed. (Auth. mod.)

**H-57221**

Deriapa, N.R., **Medical geography of the Arctic and Antarctic**, *Polar geography*, Apr.-June 1996, 20(2), p.129-136, Translated from Izvestiia Rossiiskogo geograficheskogo obshchestva. Refs. p.133-136.

An exploratory paper surveys important issues to be addressed in the study of medical geography of the arctic and antarctic regions. It also provides an extensive review of the Russian-language literature on the subject and sheds light on major directions for future research. (Auth. mod.)

**H-57728**

Vashchenkov, V.M., Klopov, V.P., Iakovlev, V.A., **Condition of the immune system of polar explorers in Antarctica** [Sostoianie immunnogo sistema poliarnikov v Antarktide], *Antarktika*, 1995, No.33, p.176-180, In Russian with English summary. 17 refs.

The results of a study of the humoral immunity of antarctic expedition members overwintering at coastal stations are discussed. The immune status of two groups of winterers was investigated. The first group consisted of those taking part in an antarctic expedition for the first time, and the second, of those who had been to Antarctica before. The observations were made over a period of 18 months, which included the sea voyage from Antarctica to Russia and the period of readaptation in St. Petersburg. (Auth. mod.)

**H-58104**

Xu, S.H., Xue, Q.F., Xue, Z.H., Wang, Z.H., **Studies on the plasma tryptophan and urinary 5-hydroxy-3-indoleacetic acid in expedition members residing in Antarctica**, *Chinese journal of polar science. Series No.14*, June 1997, 8(1), p.72-76, 10 refs.

To determine the possible relationship between the changes of behavior/personality and metabolic changes of 5-hydroxytryptamine (5-HT) in antarctic expeditioners, plasma tryptophan (Trp) and urinary 5-hydroxy-3-indoleacetic acid (5-HIAA) were studied in 24 winter-over and 19 summer-only members of the 8th and 11th Chinese expeditions. Results show that plasma Trp decreased significantly after residing 1-3 months at the Great Wall Station; the urinary 5-HIAA increased significantly after residing 6 months at the Great Wall Station. The decrease of plasma Trp may be related to the decline of brain 5-HT, which might play a role in the changes

of behavior/personality. Increase of urinary 5-HIAA might reflect metabolic changes of 5-HT as a whole, but the cold weather effect on the release response of platelet should be considered. (Auth. mod.)

**H-58165**

Tingate, T.R., Lugg, D.J., Muller, H.K., Stowe, R.P., Pierson, D.L., **Antarctic isolation: immune and viral studies**, *Immunology and cell biology*, June 1997, 75(3), p.275-283, 34 refs.

Stressful environmental conditions are a major determinant of immune reactivity in Antarctica. Alterations of T cell function were documented during a 9-month period of isolation. T cell dysfunction was mediated by changes within the peripheral blood mononuclear cell compartment, including a paradoxical atypical monocytosis associated with altered production of inflammatory cytokines. There was a striking reduction in the production by peripheral blood mononuclear cells of the predominant pro-inflammatory monokine TNF- $\alpha$  and changes were also detected in the production IL-1, IL-2, IL-6, IL-1 $\alpha$  and IL-10. Prolonged antarctic isolation is also associated with altered latent herpesvirus homeostasis. These findings have important long-term health implications. (Auth.)

**H-58301**

Cugini, P., Camillieri, G., Alessio, L., Cristina, G., Petrangeli, C.M., Capodaglio, P.F., **Ambulatory blood pressure monitoring in clinically healthy subjects adapted to living in Antarctica**, *Aviation, space and environmental medicine*, Sep. 1997, 68(9), p.795-801, 28 refs.

This study investigates 24-h blood pressure (BP) and heart rate (HR) values in clinically healthy subjects adapted to living at Terra Nova Bay Station. The 24-h BP and HR values were measured via a noninvasive ambulatory monitor, and statistically analyzed via conventional and chronobiological procedures. The normotensive subjects living in Antarctica showed significant changes in the daily mean level of systolic BP (increase) and HR (decrease) as compared to their controls residing out of Antarctica. In addition, the BP and HR circadian rhythms were perfectly synchronized to the 24-h cycle, despite the permanent solar light, as an effect imposed by the routines of the subjects' local lifestyle. The observed changes reflect a tonic modulation of the BP and HR circadian rhythms which allows the cardiovascular apparatus to adapt without imposing an extra load on its function. (Auth. mod.)

See also:

G-56626 G-58154 I-56823 I-57414



# I. METEOROLOGY

## I-56346

Honda, H., et al, **Newly developed grab sampling system for collecting stratospheric air over Antarctica**, *Antarctic record*, July 1996, 40(2), p.156-168, With Japanese summary. Refs. p.167-168.

In order to measure the concentrations of various minor constituents and their isotopic ratios in antarctic stratosphere, a simple grab sampling system was developed and launched at Showa Station in Jan. 1996. The sampler consisted mainly of a 15 l sample container with electromagnetic and manual valves, control electronics for executing the air sampling procedures and sending the position and status information of the sampler to the ground station, batteries and a transmitter. All these parts were assembled in an aluminum frame gondola with a shock absorbing system for landing. The sampler was equipped with a turn-over mechanism of the gondola, to minimize contamination, and a GPS receiver and a rawinsonde for its tracking. Total weight of the sampler was about 11 kg. To receive, display and store the position and status data of the sampling system at the ground station, a simple data acquisition system with a portable receiver and a microcomputer was also developed. A new gas handling system was prepared to simplify the injection of He gas into the balloon. (Auth. mod.)

## I-56347

Schwarz, G., Ohm, K., Yamanouchi, T., Furukawa, T., Kowski, P., Gernandt, H., **Stable isotopic composition of antarctic air moisture and precipitation**, *Antarctic record*, July 1996, 40(2), p.169-178, With Japanese summary. 15 refs.

First results of stable isotope analyses which were obtained by sampling of air moisture and precipitation at Showa Station and Dome Fuji are presented. The isotopic compositions, expressed in delta values of deuterium and  $^{18}\text{O}$  relative to the standard mean ocean water (SMOW), are scattered over a wide range of magnitudes. A weak, but significant, quantitative relationship between  $\delta^{18}\text{O}$  of precipitation at Showa and the distance to open sea was found. Extreme high isotopic delta values appear at both stations when air is transported from lower latitudes to the antarctic continent. These preliminary results were obtained from observations in Jan. 1995. They will be continued at these stations until about Jan. 1997. (Auth. mod.)

## I-56349

Takao, T., Koike, J., Kamata, Y., Sugita, O., Sakurai, K., **Meteorological observations at Syowa Station in 1993 by the 34th Japanese Antarctic Research Expedition**, *Antarctic record*, July 1996, 40(2), p.202-246, In Japanese with English summary. 6 refs.

Results of meteorological observations, carried out by JARE-34 from Feb. 1, 1993 to Jan. 31, 1994 at Showa Station, are as follows: annual mean surface air pressure and temperature were somewhat lower than normal; blizzards occurred 34 times, and there was a record strong blizzard in Dec.; in the stratosphere, air temperature was very low in winter and spring; the deepest ozone hole to date was observed. Total ozone recorded 140 m atm-cm on Oct. 11, the lowest ever at Showa Station; and with the Brewer spectrophotometer, solar spectral UV irradiance was observed throughout the year. Data are presented in numerous tables and charts. (Auth. mod.)

## I-56361

Turner, J., et al, **Antarctic First Regional Observing Study of the Troposphere (FROST) Project**, *American Meteorological Society. Bulletin*, Sep. 1996, 77(9), p.2007-2032, 54 refs.

An account is given of the Antarctic First Regional Observing Study of the Troposphere (FROST) project, which has been organized by the Physics and Chemistry of the Atmosphere Group of the Scientific Committee on Antarctic Research. The goals of FROST are to study the meteorology of the Antarctic, to determine the strengths and weaknesses of operational analyses and forecasts over the continent and in the surround-

ing ocean areas, and to assess the value of new forms of satellite data that are becoming available. FROST is based around three one-month special observing periods for which comprehensive datasets have been established of model fields and *in situ* satellite observations. (Auth. mod.)

## I-56362

Raper, S.C.B., Wigley, T.M.L., Warrick, R.A., **Global sea-level rise: past and future**, Sea-level rise and coastal subsidence: causes, consequences, and strategies. Edited by J.D. Milliman and B.U. Haq. Vol.2, Dordrecht, Netherlands, Kluwer Academic Publishers, 1996, p.11-45, Refs. p.35-39.

**DLC GC89.S427 1996**

This paper reviews observationally based estimates of past global-mean temperature change and sea-level rise from 1880-1990, and compares them with model-based estimates. The climate model used is a simple upwelling-diffusion, energy-balance model, which is coupled to a set of simple ice-melt models to give total sea-level change. For Antarctica, the unweighted global mean temperature change is used. The authors conclude that the temperature has risen by  $0.5 \pm 0.15^\circ\text{C}$  and sea level has risen by about 10-20 cm.

## I-56369

Manzini, E., Bengtsson, L., **Stratospheric climate and variability from a general circulation model and observations. Pt.II: Results for March-May, June-August and September-November**, Report No.ETDE-DE-159, Hamburg, Germany, Max-Planck-Institut für Meteorologie, May 1995, 36p., DE95-790221, Refs. p.27-29.

This report is the second part of a work aimed at studying the climate and variability of the large scale stratospheric circulation by comparing atmospheric statistics from a simulation performed with a general circulation model and from global analyzed observations. Part I focused on Dec.-Feb., while here the remaining part of the seasonal cycle is discussed. The Mar.-May climatological seasonal mean zonal mean circulation is found to be reasonably well simulated. A comparison with the boreal winter, the interannual variability of the austral winter is smaller at high latitudes, in the simulation as well as in the observed state. Although the structure of the observed variability is captured by the model, its magnitude is underestimated especially in Aug. Significant discrepancies between the model results and the analyzed observations are found during the final vortex breakdown (Sep.-Nov.) in the Southern Hemisphere, apparently caused by insufficient large scale orographic forcing from the antarctic continent in the current low resolution model. (Auth. mod.)

## I-56378

Vial, F., **Mechanisms of the antarctic ozone hole: the Stratéole Experiment** [Les mécanismes du trou d'ozone antarctique: l'expérience stratéole], *Association de Géographes Français. Bulletin*, Sep. 1996, 73(4), p.304-312, In French with English summary. 4 refs.

The authors present a report on atmospheric ozone and on mechanisms responsible for the ozone depletion on Antarctica during the end of winter and the beginning of polar spring. Photochemical processes are now well known but there are a lot of uncertainties concerning the transportation of minor constituents playing a role in the chemistry of the atmosphere. The Stratéole experiment will study stratospheric winds, radiation, aerosols and minor constituents and rare gases and their action in the polar lower stratosphere. (Auth. mod.)

## I-56384

Lorius, C., Le Pichon, X., **Paleoclimate in polar regions: ice cores, lakes and polar seas sediments**, Oceans and the Poles—European co-operation in ocean and polar research. 2nd edition, Strasbourg, European Science Foundation, Sep. 1993, p.56-59, 5



refs.

The importance of paleostudies has in particular been recognized by the establishment of several programs within the International Geosphere Biosphere Project (IGBP). These include PAGES (Past Global Changes), the first core project established within IGBP, and the long record sampling at JGOFS (Joint Global Ocean Flux Study) stations which require long undisturbed cores. High resolution sediment cores in the polar oceans will provide the key to understanding the continental and ice core records and vice-versa. These programs are focused on several time scales: earth history over the past 2,000 years to provide a base time against which human impacts can be measured; glacial-interglacial cycles in the late Quaternary, in particular over the last 150,000 years, to study natural long-term as well as abrupt climatic changes; and a longer time scale (100,000 to 10,000,000 years) taking into account forcing by tectonic changes which provoked the transition to Glacial Climate. (Auth. mod.)

### I-56388

Fonteyn, D., Larsen, N., **Detailed PSC formation in a two-dimensional chemical transport model of the stratosphere**, *Annales geophysicae*, Mar. 1996, 14(3), p.315-328, 48 refs.

A new two-dimensional zonal model of the stratosphere, based on a formulation in an isentropic framework, with complete chemistry has been coupled with a high resolution detailed microphysical model for polar stratospheric clouds (PSCs). The 2D model chemistry includes all presently known heterogeneous processes on sulfate aerosols and PSCs. The coupling of these two models, with inherently different time scales, is discussed. It is demonstrated that in order to obtain a realistic interrelationship between  $\text{NO}_y$  and  $\text{N}_2\text{O}$  an accurate simulation of the sedimentation by PSC particles is necessary. A good agreement of model PSC presence and observations is found for the antarctic polar winter without the need to impose additional artificial temperature variations in the model. The calculated occurrence of polar stratospheric clouds and resulting heterogeneous chemistry during the antarctic winter are discussed. Sensitivity of the polar stratospheric chemical composition and cloud formation for different perturbations is investigated by studying the effects of transport across the polar vortex boundary and heterogeneous processing by an enhanced sulfate aerosol load. The importance of including sedimentation for all cases is also discussed. (Auth.)

### I-56420

Brown, D.E., George, S.M., **Surface and bulk diffusion of  $\text{H}_2^{18}\text{O}$  on single-crystal  $\text{H}_2^{18}\text{O}$  ice multilayers**, *Journal of physical chemistry*, 1996, 100(38), p.15460-15469, 65 refs.

Heterogeneous reactions on polar stratospheric clouds (PSCs), in the arctic and antarctic atmosphere, composed of ice (type II PSC) and  $\text{HNO}_3$  hydrates (type I PSC) have recently been shown to play a key role in polar ozone loss. The kinetics of these processes may be affected by  $\text{H}_2\text{O}$  mobility on the ice surface and in the underlying ice bulk. In a simulation of these processes, the experiments in this paper investigated the surface and bulk diffusion of  $\text{H}_2^{18}\text{O}$  on crystalline  $\text{H}_2^{16}\text{O}$  ice multilayers grown epitaxially on Ru(001). These experiments were conducted at temperatures from 155 to 165 K which are significantly lower than earlier measurements and are close to temperatures in the stratosphere. Extrapolation of these bulk diffusion data to stratospheric temperatures provided predictions for the  $\text{H}_2\text{O}$  residence time on the ice surface before diffusion into the underlying ice bulk. (Auth. mod.)

### I-56435

Marsiat, I., **Ice-sheets' surface mass-balance evaluation in the UGAMP GCM: the climate of Antarctica**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.167-173, 35 refs.

General Circulation Models (GCMs) will be more and more used for coupled climatic simulations involving ice sheets. It is therefore of prime importance to evaluate the performance of these models in simulating the mass balance and climate over ice sheets. The antarctic climate simulated with the U.K. Universities Global Atmospheric Modelling Programme General Circulation Model is in good agreement with the available observations. In particular, the accumulation pattern appears fairly reasonable. Some imperfections are related to the surface temperature and energy bud-

get but without severe consequences for the atmosphere behavior. Refining the snow-related parameterizations could improve the results of the model in high latitudes. (Auth.)

### I-56436

Paul, A., **Seasonal energy-balance climate model for coupling to ice-sheet models**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.174-180, 24 refs.

An energy-balance climate model designed for coupling to ice-sheet models is presented. Its independent variables are longitude, latitude and time of the year. The model is based on the vertically integrated equations of conservation of energy and humidity. It can predict the vertically averaged temperature. Since it includes a hydrological cycle, it can also diagnose the net fresh-water flux and hence the annual snow budget at the atmosphere-ice-sheet interface. To this end, the model does not require observed precipitation rates. The computational cost is reduced by using an analytically computed Fourier-Legendre representation of daily insolation. For a highly idealized test-case configuration, two simple sensitivity experiments are carried out. (Auth.)

### I-56437

Ohmura, A., Wild, M., Bengtsson, L., **Present and future mass balance of the ice sheets simulated with GCM**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.187-193, 30 refs.

A high-resolution GCM ECHAM3T106 was used to simulate the climates of the present and of the future under doubled  $\text{CO}_2$ . The ECHAM3T106 was integrated for an equivalent time of 5 years with the observed SST of the 1980s, and with the SST for the  $2 \times \text{CO}_2$  climate generated from the ECHAM1T21 coupled transient experiment. The main motivation for using the GCM to simulate the mass balance is the level of skill in simulating precipitation and accumulation recently achieved in the high-resolution GCM experiment. The ablation is computed, based on the GCM internal surface fluxes and the temperature/ablation relationship formulated on the Greenland field data. The two ice sheets show very different reactions towards doubling the  $\text{CO}_2$ . As the decrease in accumulation and the increase in ablation in Greenland cause an annual mean specific mass balance of -225 mm (eq.  $-390 \text{ km}^3$ ), the increase in accumulation and virtually non-melt conditions in Antarctica result in a mean annual specific mass balance of +23 mm (eq.  $+325 \text{ km}^3$ ). The sum of the mass balance on both ice sheets is equivalent to the annual sea-level rise of 0.2 mm. (Auth. mod.)

### I-56458

Aoki, S., Kawaguchi, S., Nakagawa, T., **Measurements of atmospheric  $\text{CO}_2$  and  $\text{CH}_4$  at Japanese antarctic station, Syowa**, Japan National Committee for the International Geosphere-Biosphere Programme. International Symposium on Global Change (IGBP), Tokyo, Mar. 27-29, 1992. Proceedings, Tokyo, Waseda University, [1994], p.44-67, DE94-765351, 29 refs.

Continuous measurements of the major greenhouse gases,  $\text{CO}_2$  and  $\text{CH}_4$ , have been made at Showa Station since 1984 and 1988, respectively. The average annual increase of  $\text{CO}_2$  concentration over the last 5 years was 1.6 ppmv/yr. The secular  $\text{CO}_2$  trend showed a slow increase in 1984, 1986 and 1988 and rapid increase in 1985 and 1987, which may be related to the 1988/1987 ENSO event. The average seasonal  $\text{CO}_2$  cycle showed minimum and maximum concentrations in mid-April and early October, respectively, and its peak-to-peak amplitude was about 1.1 ppmv. There was no indication of a long-term increase or decrease in the amplitude during the seasonal cycle. The average seasonal  $\text{CH}_4$  variation showed minimum and maximum concentrations in early Mar. and late Sep., respectively, and a peak-to-peak amplitude of 30 ppbv. The average increase rate of the  $\text{CH}_4$  concentration was 10.2 ppbv/yr for the period 1988-1990. (Auth. mod.)

### I-56460

Jouzel, J., Lorius, C., **Polar ice: rapid change in the climate** [Glaces polaires: variations rapides du climat], *La houille*



*blanche*, 1995, No.5/6, p.98-103, In French. 29 refs. Presented at Colloque Glaciologie et nivologie: état des recherches et connaissances à la fin du XX<sup>e</sup> siècle (Symposium on Glaciology and Snow Science: State of the Art at the End of the 20th Century), Grenoble, France, Feb. 15-16, 1995.

Ice core records of the last 140,000 years from Summit in Greenland and Vostok in Antarctica are compared. Climatic changes appear more often and more rapidly in the Greenland than the Vostok record, but warming or cooling periods lasting more than 2000 years in the Greenland record usually appear later and less pronounced in the Vostok record. It is suggested that we are now in an interglacial period in the arctic likely to be followed by an interglacial period in the antarctic.

#### I-56462

Raynaud, D., Barnola, J.M., Chappellaz, J., **Polar ice: a note on the changes affecting greenhouse gases** [Les glaces polaires: une mémoire de l'évolution des gaz à effet de serre], *La houille blanche*, 1995, No.5/6, p.123-125, In French. Presented at Colloque Glaciologie et nivologie: état des recherches et connaissances à la fin du XX<sup>e</sup> siècle (Symposium on Glaciology and Snow Science: State of the Art at the End of the 20th Century), Grenoble, France, Feb. 15-16, 1995.

A brief summary is given of the concentrations of carbon dioxide and methane in the atmosphere as recorded in ice cores from Greenland and Antarctica for the last two centuries and in particular, from the Vostok ice core for the last 150,000 years. Until about 1850 as recorded in the Vostok ice core, the CO<sub>2</sub> concentration has fluctuated between about 200 and 300 ppm, and the CH<sub>4</sub> concentration has fluctuated between about 300 and 700 ppb. Since 1850 worldwide, the CO<sub>2</sub> concentration has increased to its present value of 350 ppm, and the CH<sub>4</sub> concentration has increased to 1700 ppb.

#### I-56467

IUrganov, L.N., Radionov, V.F., Karol, I.L., Ozolin, I.U.E., **On impact of antarctic stratospheric ozone depletion on tropospheric trace gases**, *Journal of ecological chemistry*, 1993, No.1, p.85-92, 21 refs.

Results of total column ozone and carbon monoxide optical measurements at Mirny Station in 1976-1991, as well as surface atmospheric concentrations observed over the Weddell Sea have been compared to values calculated with the 1-D model. During the spring months the amount of CO decreases as a result of reaction with hydroxyl, the concentration of which increases with UV solar radiation. The observed and calculated data show that CO concentration is profoundly affected by the total content of ozone (the main UV absorber) during the illuminated period of the year. As a result of this dependence, the stratospheric ozone depletion observed in the Antarctic could cause a negative trend of CO and a positive trend of OH. This dependence has to be taken into account in considering the trends of other atmospheric gases, especially in the Southern Hemisphere. An attempt to compose a model for diurnal variations of ozone concentration, observed in the surface layer over the Weddell Sea, failed. It is suggested that some unknown trace substances of marine origin take part in photochemical ozone production and destruction in the antarctic spring troposphere. (Auth.)

#### I-56480

Lal, B., **Meteorological studies during the Fourth Indian Scientific Expedition to Antarctica: December 1984 to March 1986**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.107-136, 11 refs.

**DLC G850.I53I53 1984**

During the Fourth Indian Scientific Antarctic Expedition, meteorological observations were carried out at Dakshin Gangotri Station to find out the possible effect of antarctic climate on different weather systems on lower latitudes of the Southern/Northern hemispheres. Vast amount of data was collected in order to study the radiation balance, radiation flux in the upper atmosphere, the heat transfer in various layers, the temperature inversion in the lower levels of the antarctic atmosphere and its role in causing blizzards. Studies on thermal structure of the antarctic atmosphere and atmospheric electricity were also carried out. (Auth. mod.)

#### I-56490

U.S. Congress. Senate. Committee on Commerce, Science and Transportation, **Hearing before the Subcommittee on Science, Technology and Space of the Committee on Commerce, Science and Transportation, U.S. Senate, One Hundred First Congress, First Session, on arctic and antarctic ozone depletion, February 23, 1989**, Washington, D.C., U.S. Government Printing Office, 1989, 160p.

**DLC KF26.C697 1989**

The hearing convened on Feb. 23, 1989, to discuss current understanding of the physical and chemical processes that control atmospheric ozone, globally and in the polar regions. Witnesses included representatives of the Air Conditioning and Refrigeration Institute, E.I. DuPont, Inc., NOAA, NASA, and Allied-Signal, Inc., who presented prepared statements and responded to questions from members of the Subcommittee. Additional articles, letters and statements presented at the hearing are also provided.

#### I-56507

Galtsev, A.P., Grechko, E.I., Dzhola, A.V., Elanskii, N.F., Malkov, I.P., Pugachev, N.S., **Spectroscopic measurements of the atmospheric gases contents. Latitudinal distributions, seasonal variations and long-period trends**, *SPIE—The International Society for Optical Engineering. Proceedings.*, 1993, Vol.2107, Optical monitoring of the environment. Edited by N.N. Belov and E.I. Akopov, p.104-110, 9 refs.

**DLC TD193.O68 1993**

The results of spectroscopic measurements of the total vertical column abundance of minor atmospheric components (CO, CH<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>, NO<sub>2</sub>, O<sub>3</sub>) are presented. Measurements were carried out in Russia, in the arctic and antarctic regions and over the Atlantic Ocean. (Auth.)

#### I-56508

Elokhov, A.S., Gruzdev, A.N., **Spectrometric measurements of total NO<sub>2</sub> in different regions of the globe**, *SPIE—The International Society for Optical Engineering. Proceedings*, 1993, Vol.2107, Optical monitoring of the environment. Edited by N.N. Belov and E.I. Akopov, p.111-121, 28 refs.

**DLC TD193.O68 1993**

The paper reviews the results of measurements of the total NO<sub>2</sub> contents in different regions of the globe: in the antarctic region, in the Atlantic Ocean, at the Zvenigorod Scientific Station of the Institute of Atmospheric Physics. Total NO<sub>2</sub> obtained at Molodezhnaya in spring 1987 was very low until late Nov. with stratospheric warming when the filling of the ozone "hole" began. Measurements at Mirny in 1988 show the summer maximum and the usual later decrease in total NO<sub>2</sub>. Total NO<sub>2</sub> measured in the Weddell Sea during Sep.-Oct. 1989 exhibits large variations connected with the evolution of the stratospheric circumpolar vortex. Measurements over the Atlantic Ocean in May 1988 show the increase with latitude in total NO<sub>2</sub> and total ozone, most pronounced in the region of the northern subtropical jet stream. A thin latitudinal structure in total ozone and NO<sub>2</sub> has been found connected with stratosphere-troposphere exchange processes, and is confirmed by measurements during Aug.-Sep. and Nov.-Dec. 1989. In addition, the inter-hemispheric difference in total NO<sub>2</sub> is noted in 1989 measurements, associated with the NO<sub>2</sub> annual cycle. Also a sharp decrease in total NO<sub>2</sub> is noted at mid- and high latitudes of the Southern Hemisphere in spring 1989. Near Moscow, systematic total NO<sub>2</sub> measurements have been made since 1990. A decrease of up to 40% in total NO<sub>2</sub> occurred during the spring-summer period of 1992 compared with the same period of 1991, perhaps due to the eruption of the Pinatubo volcano in June 1991. (Auth. mod.)

#### I-56526

Deshler, T., Johnson, B.J., Hofmann, D.J., Nardi, B., **Correlations between ozone loss and volcanic aerosol at altitudes below 14 km over McMurdo Station**, *Geophysical research letters*, Oct. 15, 1996, 23(21), p.2931-2934, 16 refs.

Ozone and aerosol profiles over McMurdo Station have been measured Aug.-Oct. for the years 1986-1995. This spans the development and decay of the recent perturbation to stratospheric aerosol caused by Pinatubo. Volcanic aerosol surface areas, in the 11-14 km region, peaked



near  $100 \mu\text{m}^2/\text{cm}^3$  in 1991, decaying to  $20\text{--}30 \mu\text{m}^2/\text{cm}^3$  in 1992,  $15\text{--}25 \mu\text{m}^2/\text{cm}^3$  in 1993, and to background levels of  $4\text{--}8 \mu\text{m}^2/\text{cm}^3$  in 1994. Based on these measurements the volcanic aerosol signal persisted over Antarctica for three austral springs, implying an exponential decay rate of about 14 months. The aerosol below 14 km was correlated with previously unobserved ozone loss at these altitudes. Ozone loss rates of  $5\text{--}15 \text{ ppb/dy}$  ( $0.3\text{--}0.5 \text{ DU/dy}$ ) were observed in the 10-12 and 12-14 km layers. Beginning in 1994, when the aerosol approached its pre-Pinatubo level, ozone loss diminished in the 12-14 km layer, and was not observed in the 10-12 km layer. (Auth.)

#### I-56527

Wilkniss, P.E., **Now you see it, now you don't: the ozone hole**, *Forum for applied research and public policy*, Summer 1990, 5(2), p.29-36, 16 refs.

Insights are provided to the good and bad qualities of ozone and to the ozone hole over Antarctica. Chemicals and chemical processes which deplete the stratospheric ozone layer are discussed along with man-made influences on the depletion cycle. Research programs dealing with this problem since the IGY and since 1985 are identified. The dimension and scope of the ozone hole, its research and education aspects, and economic and political considerations are briefly stated as policy issues. A possible model for political response is suggested in some of the actions already taken to alleviate the problem.

#### I-56536

Singh, S., Kulandaivelu, E., **Establishment of a new meteorological observatory at Maitri and study of meteorological parameters, ozone depletion in antarctic spring and solar radiation during Ninth Antarctic Expedition**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.35-56.

India Meteorological Department established its full-fledged meteorological observatory at Maitri Station in Jan. 1990 and discontinued meteorological observations at Dakshin Gangotri Station. Details of the installation of meteorological instruments and of the tabulated data collected during 1989, and from Jan. 1990 to Jan. 1991, are discussed.

#### I-56537

Pasricha, P.K., **Comparative study of the variability in the observed ozone and that obtained from a statistical model of catalytic destruction over Antarctica**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.57-64, 16 refs.

Day-to-day fluctuations in total ozone during the ozone hole period (using the TOMS data) over the Maitri Station are presented. A statistical correlation analysis is performed to reveal a characteristic correlation period ( $T_0$ ) in the fluctuations. The extent of the effective data sample ( $T$ ) to be analyzed is given. A value of  $\sigma_T$  during the ozone hole period of Sep. 1987 is found to be about 6 D.U., which is 3 D.U. above the noise rms associated with the TOMS data. The signal rms variability of 3 D.U. estimated in the ozone hole period is compared with the statistical fluctuations inherent in the process of destruction of ozone through chlorine and bromine catalysis in the lower stratosphere. The resultant rms variability in the mean ozone level requires the values of  $T_0$  and  $T$ , and is also shown to be about 3 D.U. The fluctuations in total ozone in other non-ozone hole months are analyzed. (Auth. mod.)

#### I-56586

Leventer, A., Domack, E.W., Ishman, S.E., Brachfeld, S., McClennen, C.E., Manley, P., **Productivity cycles of 200-300 years in the Antarctic Peninsula region: understanding linkages among the sun, atmosphere, oceans, sea ice, and biota**, *Geological Society of America. Bulletin*, Dec. 1996, 108(12), p.1626-1644, Refs. p.1642-1644.

The authors present a multiproxy record from a sediment core retrieved from a deep basin on the western side of the Antarctic Peninsula that reveals a dramatic perspective on paleoclimatic changes over the past 3700 yr. Analyses completed include measurement of magnetic susceptibility and granulometry, bed thickness, particle size, percent organic car-

bon, bulk density, and microscopic evaluation of diatom and benthic foraminiferal assemblages and abundances. Downcore variability of these parameters demonstrates the significance of both short-term cycles, which recur approximately every 200 yr, and longer term events (approx. 2500 yr cycles) that are most likely related to global climatic fluctuations. Overall elevated productivity is noted below 600 cm, or prior to ca. 2500 yr B.P. This increased productivity may represent the tail end of a Holocene climatic optimum, which is widely recognized in other parts of the world, but as yet is poorly documented in Antarctica. (Auth. mod.)

#### I-56590

Cheong, H.B., Kimura, R., **Excitation of the 5-day wave by Antarctica**, *Journal of the atmospheric sciences*, Jan. 1, 1997, 54(1), p.87-102, 28 refs.

The 5-day wave has been detected in composite maps of geopotential height fields of European Centre for Medium-Range Weather Forecasts dataset for 7 years (1984-91, except 1985) and shows a characteristic northwest-southeast meridional phase tilt in the Southern Hemisphere. A numerical integration of Laplace's tidal equations with periodic forcing of zonal wavenumber 1 only produced the meridional phase tilt where the forcing is located in high latitudes. Such a forcing is created through coupling of the time-fluctuating westerlies with the topography of Antarctica. Numerical simulations that incorporated this mechanism reproduced the observed meridional phase tilt of the 5-day wave, which suggests that Antarctica is responsible for the observed phase tilt through the process of resonance. A linear theory on the meridional phase tilt is given with a nondivergent barotropic model that includes both forcing and dissipation. (Auth.)

#### I-56610

Rao, T.V.P.B., **Meteorological studies at Antarctica during the period March, 1986 to February, 1987**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.259-281, 2 refs.

#### DLC G850.I53 I53

A permanently manned meteorological observatory was established at Dakshin Gangotri Station during the 3rd Indian expedition to Antarctica, for continuous recording of meteorological parameters. Monthly averages and extreme values of pressure, temperature, wind speed and monthly blizzard frequency are given for the period Mar. 1, 1986 to Feb. 15, 1987. Analysis shows that Jan. 1987 was the warmest, and July 1986, the coldest month with average temperatures of  $-1.9^\circ\text{C}$  and  $-30.3^\circ\text{C}$ , respectively. During the previous two winters, Aug. was the coldest month, with average monthly temperatures of  $-32.6^\circ\text{C}$  (1984) and  $-33^\circ\text{C}$  (1985). The monthly average temperatures in Jan. 1985 and 1986 were  $-2.2^\circ\text{C}$  and  $-3.0^\circ\text{C}$ , respectively. (Auth. mod.)

#### I-56611

Sharma, A.C., **Blizzard storms: coastal regions of Indian antarctic station, Dakshin Gangotri (1985-1986 summer)**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.283-287.

#### DLC G850.I53 I53

The 5th Indian expedition experienced one of the worst summer seasons in Antarctica. Out of a total stay of 69 days at Dakshin Gangotri Station the occurrence of either blizzards or strong winds was recorded on 45 days. Weather forecasts based on the available instruments made it possible to accomplish the various assigned tasks. In this paper, a systematic synoptic study of weather conditions, highlighting the blizzard storms at Dakshin Gangotri Station in the summer of 1985-86, is discussed. (Auth. mod.)

#### I-56612

Apte, N.Y., Rao, T.V.P.B., **Automatic weather station at Dakshin Gangotri, Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.289-297, 2 refs.

#### DLC G850.I53 I53



The India Meteorological Department has set up an automatic weather station known as Data Collection Platform (DCP) at Dakshin Gangotri Station during the 5th Indian expedition. The weather parameters at each GMT hour are sensed by the system and transmitted to the Meteorological Data Utilisation Centre at New Delhi on real time basis, through Indian National Satellite (INSAT-1B). In this paper, a detailed description of the data collection platform system, the sensors used in the system and the difficulties experienced during installation of this system are highlighted. The data received from DCP is compared with manual observations recorded at the station. The results are found to be encouraging. The difficulties arising in maintaining the system in extreme weather are also discussed. (Auth. mod.)

#### I-56613

Sharma, A.C., **Note on the role of sub-tropical anticyclones of Southern Hemisphere on the severity and persistence of weather over coastal Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.299-301.

**DLC G850.I53 I53**

The process of subtropical anticyclone activity held responsible for weather changes over antarctic coastal regions is described. Such effects were noticed in Jan.-Feb. 1986, at Dakshin Gangotri Station, during long spells of consistently bad weather.

#### I-56614

Singh, S., **Typical meteorological and oceanological situations encountered during the Fifth Indian Scientific Expedition to Antarctica (1985-86)**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.303-308, 4 refs.

**DLC G850.I53 I53**

During the 5th Indian expedition, round the clock meteorological data were collected on board the MV *Thuleland*, to and from Antarctica, and during the stay in a polynya near Dakshin Gangotri Station. The paper highlights some of the prominent meteorological conditions encountered, including two severe storms during the ship's return journey. Extreme values of meteorological parameters recorded in the polynya are also given. (Auth. mod.)

#### I-56627

Parashar, D.C., et al, **Note on comparative methane measurements on an antarctic air sample**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.465-466.

**DLC G850.I53 I53**

Methane concentration measurements were carried out in air samples from 3 different localities, including antarctic samples collected at the beginning and the end of the 5th Indian expedition, Dec. 28, 1985 and Feb. 27, 1986. Results of the analyses are compared and future plans for such work in Antarctica are outlined.

#### I-56630

Karoly, D.J., Hope, P., Jones, P.D., **Decadal variations of the southern hemisphere circulation**, *International journal of climatology*, July 1996, 16(7), p.723-738, 25 refs.

A data set of monthly mean surface and sea-level pressure observations from a number of stations in the Southern Hemisphere (SH), including Antarctica, for the period since 1901 has been used to investigate interannual and interdecadal variations of the SH circulation. A fairly uniform network of 62 stations was selected with data for the period 1955-1985, with a reduced network of 35 stations having data for the longer period 1901-1985. The sparse network has stations mainly on the SH tropical and mid-latitude land masses with few islands or high-latitude stations. The sparse station network is able to capture the dominant modes of variability found in the period 1955-1985 using the denser network. The leading mode is associated with the El Niño-Southern Oscillation and is well resolved by the sparse network. This is the leading mode for interannual and interdecadal variations throughout the last century, but there are

periods when it has reduced variance and a somewhat different structure, notably 1916-1935. Other modes of interannual variations show marked changes in importance on decadal or longer time-scales. (Auth. mod.)

#### I-56634

Hanjura, A.K., Singh, R., **UV-B radiation intensity measurements at Antarctica**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.17-34, 15 refs.

The UV-B radiation intensity measurements, at various wavelengths, were carried out at different time slots from Jan. 1987 to Feb. 1992. The analysis of these observations shows that, in addition to atmospheric ozone, the other factors like cloud scattering and aerosol scattering also play an important role in affecting the solar UV-B intensities. It is found that due to these additional factors, the anticorrelation factor between atmospheric ozone content and UV-B intensity is different for different atmospheric conditions over the Maitri Station. (Auth.)

#### I-56635

Hanjura, A.K., **Boundary layer studies by acoustic sounder at Indian antarctic station Maitri**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.35-41, 4 refs.

An acoustic sounder system was installed at Maitri Station in the summer of 1991. This instrument consists of a low power audio frequency generator, transmitting tone-burst vertically up into the air, receiving the weak echo returning from atmospheric irregularities, and recording them on to recorder/digital printer. Among the various types of structures observed by the acoustic sounder were the echo patterns, representing ground-based inversions and variable structures on the surface of the inversion layer, throwing light on the nature of the planetary boundary layer. (Auth.)

#### I-56636

Hanjura, A.K., Venkatachari, R., **Interesting features of infrasonic pressure variations at Maitri, Antarctica**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.43-53, 6 refs.

A microbarograph was used to study the features of the infrasonic pressure variations at Maitri Station. A few features are described, and a possible linkage of infrasonic pressure variations with temperature changes in the stratosphere is suggested. (Auth.)

#### I-56637

Sharma, R.K., **Report on meteorological programme during summer period of Tenth Indian Expedition to Antarctica**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.55-70.

The antarctic weather influences the global climate to a great extent. In order to study meteorological features over Antarctica and correlate these with Indian weather, the meteorological observational program of the India Meteorological Department has been a regular component of each Indian expedition to Antarctica. The major objectives of the summer meteorological program of the 10th expedition are listed, and results are discussed and presented in tables. (Auth. mod.)

#### I-56638

Gulhane, P.M., Katariya, S.S., **Meteorological studies carried out at Maitri during winter period of Tenth Indian Scientific Expedition to Antarctica**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.71-91.

Extensive meteorological observations, comprising surface and upper air parameters and total and vertical ozone profiles, taken on board ship and at Maitri Station during 1991, are discussed. Data show that Aug. was the coldest month, with a lowest monthly mean air temperature of -17.0°C. A total of 15 blizzards occurred during 27 days; warmer air temperatures were recorded during the blizzards. The effects of antarctic climate on global climate are considered. (Auth. mod.)



**I-56646**

Ramachandran, T.V., Balani, M.C., **Report on the participation by the Bhabha Atomic Research Centre in the Tenth Indian Expedition to Antarctica**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.159-180, 13 refs.

The antarctic continent can be expected to provide reference levels for all environmental and pollution studies due to its remoteness and restricted human activities. The Bhabha Atomic Research Centre (BARC) has participated in the 10th expedition primarily to collect background baseline data on natural radioactivity, heavy metal concentration in soil and water, and biological specimens. While radioactivity data and some limited heavy metal concentration data have already been collected in air, water and soil samples during the 8th and 9th expeditions, this is the first time BARC made attempts to collect biological samples as well. Fairly complete data were obtained from samples and are presented in this report. The analytical procedures followed at BARC, mainly approved standardization techniques, are described. (Auth. mod.)

**I-56660**

Hurtak, J.J., **World ozone dilemma: research and results with remote sensing**, *International journal of energy, environment, economics*, 1991, 1(3), p.209-218, 53 refs.

**DLC TD195.E49 I57 1 1991 1-3**

In order to study the chemically perturbed region of the Antarctic and the Arctic, NASA initiated airborne and satellite imaging of the ozone depletion through the specialized ER-2 plane (at  $\approx 18$  km) and the modified DC-8-72 aircraft (at  $\approx 12.5$  km) with remote sensing systems onboard. Instruments onboard the aircraft surveyed the atmosphere from various altitudes and instruments on the Nimbus-7 satellite analyzed reflected sunlight. Measurements were designed to gauge not only the extent of ozone depletion over the Antarctic/Arctic, but other chemical changes in the stratosphere. Activities carried out within programs of remote sensing and *in situ* measurements by aircraft are compared to TOMS onboard the Nimbus-7, as well as Dobson network ground stations. Through these methods, scientists have been extremely successful in mapping the huge hole in the ozone layer that appeared over Antarctica, which is particularly extensive for about two months of each year and to confirm ozone loss in the arctic area. (Auth.)

**I-56668**

Rubin, M.J., **John Biscoe's meteorological and oceanographic observations in the Southern Ocean, 1830-1832**, *Polar record*, Jan. 1997, 33(184), p.39-46, 18 refs.

John Biscoe's voyage of discovery in the ships *Tula* and *Lively*, undertaken at the directive of the owners of the firm Messrs Enderby between 1830 and 1833, was the third expedition to circumnavigate Antarctica at a high latitude. This paper presents a digest and assessment of meteorological and oceanographic data recorded by Biscoe on that voyage. These observations, which are not normally easily accessible, substantiate the reputation of Biscoe as an assiduous and careful observer, and, when compared, they expand on the observations made during earlier circumnavigations by James Cook (1772-1775) and Thaddeus Bellingshausen (1819-1821). (Auth.)

**I-56674**

Mahesh, A., Walden, V.P., Warren, S.G., **Radiosonde temperature measurements in strong inversions: correction for thermal lag based on an experiment at the South Pole**, *Journal of atmospheric and oceanic technology*, Feb. 1997, 14(1), p.45-53, 24 refs.

Very steep shallow temperature inversions occur during most of the year in the near-surface layer on the Antarctic Plateau. A radiosonde carried by a balloon rising at a few meters per second does not measure such inversions accurately because the response time of the thermistor is several seconds. To quantify this error, the authors flew a radiosonde on a tethered kite on several occasions in winter at Amundsen-Scott Station immediately prior to the routine launch of the same sonde on a weather balloon. In all cases, the equilibrated temperatures measured by the tethered sonde at a given pressure level were higher than those from the balloon-borne sonde throughout most of the inversion layer. Assuming that the tethered sonde data represent the true atmospheric temperature profile, a procedure can be

developed to correct the temperature data from routine radiosonde soundings for the finite response time of the thermistor. The authors devise an accurate deconvolution method to retrieve the true atmospheric temperature profile from the radiosonde data when the thermistor response time is known. A correction for thermal lag is recommended for all situations where radiosondes are used to measure steep temperature gradients in the boundary layer: in polar regions throughout the year, at mid-latitude continental stations in winter, and at the tops of subtropical marine stratocumulus clouds. (Auth. mod.)

**I-56685**

Cogliani, E., Abbate, G., Racalbutto, S., **Thermal, pressure and wind fields at ground level in the area of the Italian base at Terra Nova Bay, Victoria Land, Antarctica, as observed by a network of automatic weather stations**, *Annales geophysicae*, Oct. 1996, 14(10), p.1088-1094, 17 refs.

Ground temperature, pressure and wind speed monthly averages, calculated from data collected by 9 automatic weather stations in the Terra Nova Bay area during 1987-1991, are presented. From Feb. to Mar., a rapid drop in temperature is observed at all stations. A strong thermal gradient develops during Feb.-Apr. and Oct.-Dec. between the coastal region and inner highlands. The baric configuration follows the elevation of the area. Annual average pressure and temperature as functions of station altitude show linear trends. Severe katabatic wind episodes are recorded at all stations, with wind speed exceeding 25 m/s and direction following the orographic features of the inner areas. Co-occurrences of these episodes were observed for stations located along stream lines of cold air drainage. The autocorrelation function of maximum wind speed time series shows wind persistence of 2-3 days and wind periodicity of about one week. (Auth. mod.)

**I-56687**

Ciccioli, P., Cecinato, A., Brancaleoni, E., Frattoni, M., **Occurrence of oxygenated volatile organic compounds (VOC) in Antarctica**, *International journal of environmental analytical chemistry*, 1996, Vol.62, p.245-253, 15 refs.

Polar and non-polar VOC present in six different sites located near Terra Nova Bay were determined by HRCG-MS; 76 different components were positively identified. Among them, particularly important are oxygenated components (free acids, aldehydes, ketones, alcohols, esters, ethers and furanes) as they account for the largest portion of the organic fraction. Biogenic emission seem to be the major source for many of them. This would explain their ubiquitous occurrence in the troposphere. (Auth.)

**I-56691**

Kennett, J.P., **Review of polar climate evolution during the Neogene, based on the marine sediment record**, *Paleoclimate and evolution, with emphasis on human origins*, edited by E.S. Vrba, G.H. Denton, T.C. Partridge, and L.H. Burckle, New Haven, CT, Yale University Press, 1995, p.49-64, Refs. p.60-64.

**DLC GN281.4.P35 1995**

The climate of Antarctica and the southern ocean since the Middle Eocene (ca. 50 myr) has experienced generally progressive and sequential decreases in temperature and increases in ice accumulation. Reversals of this cooling trend were unusual. The most distinct warming occurred during the Late Paleogene through the Early Neogene. No major climatic reversals in antarctic cooling occurred after the early Middle Miocene (ca. 15 myr). The development of the polar cryosphere caused fundamental changes in global oceanic and atmospheric circulation, leading in stepwise fashion to widespread aridity in middle- to low-latitude regions. Details of these developments are recounted as they progressed from Early Miocene through the Late Pliocene epochs in the antarctic polar regions. The lack of symmetry in the development of global climatic change in the Arctic regions until the Late Pliocene, is noted. (Auth. mod.)

**I-56692**

Denton, G.H., **Problem of Pliocene paleoclimate and ice-sheet evolution in Antarctica**, *Paleoclimate and evolution, with emphasis on human origins*, edited by E.S. Vrba, G.H. Denton, T.C. Partridge, and L.H. Burckle, New Haven, CT, Yale University



Press, 1995, p.213-229, 84 refs.

#### DLC GN281.4.P35 1995

There are two contrasting views concerning the Pliocene stability of the east antarctic ice sheet and coeval Pliocene paleoclimate. Because both hypotheses stand at the present time, the antarctic paleoclimatic record and ice-sheet history cannot yet contribute to the interlocked questions of paleoclimate and evolution. Antarctic ice sheet history is intertwined with the overall problems of rifting and landscape evolution in the Ross Embayment. Consequently, the Pliocene history of the antarctic ice sheet cannot be understood in isolation from the problems of the development of the west antarctic rift system and the shoulder of this rift system formed by the Transantarctic Mountains. The timing and rates of uplift and basin development are not well known, but they are important in interpreting glacial deposits in terms of ice sheet history. Different structural blocks could have had varying glacial and tectonic histories. Finally, it is not yet possible to relate terrestrial glacial sequences in the Transantarctic Mountains with offshore sedimentary sequences in the rift basins. A number of fundamental questions, must, therefore, be answered before the Pliocene glacial history of the Antarctic can be understood.

#### I-56698

Osechkin, V.V., Gnilovskoi, E.V., Kondratovich, K.V., **Effect of galactic cosmic rays on the formation of the spring maximum in the total ozone content in the polar and subpolar regions**, *USSR Academy of Sciences. Transactions. Earth science sections*, Apr. 1989(Pub. Sep. 90), 305(2), p.18-20, Translated from *Akademii nauk SSSR. Doklady*. Vol.305, No.4, p.825-828. 9 refs.

#### DLC QE1.A25183

The difficulties in explaining the spring ozone maximum may be successfully overcome if, in addition to the photochemistry, the effect of galactic cosmic ray particles (primarily protons) on the ozonosphere is included, and the structural characteristics of the Earth's magnetic field are taken into account. The authors propose the following mechanism: there is no ozone-forming insolation during the long polar night; the ozone in the lower polar stratosphere has a lifetime of between 100 and 500 days, depending on altitude. With such a long lifetime the ozone content of the polar stratosphere should remain constant from fall to spring. In actual fact, the total ozone content is observed to increase from fall to spring. This means that there must be a non-photochemical source of ozone in the polar stratosphere. It is suggested that radiolysis of molecular oxygen by galactic cosmic-ray protons is the only source generating ozone during the polar night. The mechanism is not inconsistent with the local ozone minimum observed over the central Antarctic in spring, 1983. (Auth. mod.)

#### I-56704

Mittner, P., et al, **Multiannual experiment of tropospheric aerosols at Terra Nova Bay (Antarctica): role of PIXE analysis and related techniques**, *Nuclear instruments and methods in physics research B*, Apr. 1996, Vol.109-110, International Conference on PIXE and its Analytical Applications, 7th, Padua, Italy, May 26-30, 1995. Proceedings, p.375-380, 17 refs.

In the framework of a multiannual research program, 3 summer sampling campaigns were undertaken at Terra Nova Bay with a 12 h time resolution. Important topics of interest are associated with the roles of natural aerosols in the climatic system and biogeochemical cycles, as well as with aerosol transport, origin and interactions. Despite low concentrations, 3 basic techniques (a specially designed "inertial impactor for Antarctica" (IIA); PIXE analysis; and multivariate statistical principal components analysis (PCS)) allowed identification of 2 principal components (PCs) in the coarse fraction. "Non-sea-salt sulphur" and "sea-salt" aerosol dominated respectively the fine and coarse aerosol fractions. Preliminary results for the fine fraction, based on Na, Mg, Al, S, Ca and Fe, show the existence of 3 major PCs (interpreted as "n.s.s. sulphur", "sea-salt" and "crustal"), each element being highly and significantly correlated to a particular PC. A strong increase in S concentration is observed during the sampling period. Some short "episodes" are observed in all time distributions, possibly associated with aerosol transport phenomena. The 1993-94 data and the present performance of IIA indicate that systematic work based on PIXE is now possible, despite the difficult antarctic conditions. (Auth. mod.)

#### I-56721

Rall, J.A.R., Abshire, J.B., **Antarctic Miniature Lidar**, International Geoscience and Remote Sensing Symposium, Lincoln, NE, May 27-31, 1996. IGARSS'96. Remote sensing for a sustainable future. Vol.3, New York, Institute of Electrical and Electronics Engineers, 1996, p.1538-1540, 8 refs.

#### DLC QE33.2.R4I57 1996

A second Antarctic Miniature Lidar instrument (Ant Lidar II) has been assembled, tested, and deployed to the NOAA Clean Air Facility (CAF) at the Amundsen-Scott Station. This instrument deployed in Feb. 1996 replaces the first Antarctic Lidar (Ant Lidar I) which operated at the Amundsen-Scott Station from Feb. to July 1995. The new lidar, as in the first instrument, uses redundant commercially available, single element diode lasers, a 20 cm Schmidt-Cassegrain telescope, and a silicon avalanche photodiode (APD) operated in the photon counting mode. The lidar is used to measure clouds, particularly polar stratospheric clouds and aerosol distribution at night. (Auth. mod.)

#### I-56751

Japanese Antarctic Research Expedition, **Antarctic meteorological data. Vol.36. Meteorological data at Syowa Station and Dome Fuji Station in 1995**, Tokyo, Japan Meteorological Agency, 1996, 358p.

This set of 1995 data collected at Showa Station and at Dome Fuji includes surface reports comprised of monthly and daily summaries and synoptic data; aerological data comprised of monthly summaries and upper air observations; surface radiation measurements comprised of monthly and daily summaries and hourly readings; atmospheric turbidity measurements comprised of monthly and daily summaries; total ozone, vertical ozone and ozonsonde observations; radiometersonde data; sun-photometer data on the icebreaker *Shirase* and surface synoptic data on the route from Showa Station to Dome Fuji, including aerosol optical depth measurements, with explanatory notes for interpretation of tables and on instruments and observation techniques.

#### I-56767

Beerling, D.J., Chaloner, W.G., **Atmospheric CO<sub>2</sub> changes since the last glacial maximum: evidence from the stomatal density record of fossil leaves**, *Review of palaeobotany and palynology*, Mar. 1994, 81(1), p.11-17, 25 refs.

#### DLC QE993.R4 1994

It has been shown that a strong negative correlation exists between stomatal density and atmospheric CO<sub>2</sub> concentration in the leaves of deciduous temperate forest trees. This correlation was initially established on a time scale of some 200 years, using dated leaf specimens from herbaria, and confirmed by experimental observations under controlled CO<sub>2</sub> levels. In the present investigation the authors have attempted to combine the use of fossil leaves with the long-term ice core record of CO<sub>2</sub> changes to extend the time scale of stomatal density response to CO<sub>2</sub> change. Stomatal counts were made from fossil leaves of the dwarf willow *Salix herbacea* spanning the last glacial cycle, and the authors are able to demonstrate a reduction in density in response to increased CO<sub>2</sub>. This relationship is used to reconstruct the pattern of CO<sub>2</sub> change since the last glacial maximum. The results are compared with the Byrd ice core record from Antarctica. The pattern of CO<sub>2</sub> change in both records is remarkably similar, although there is some mis-match on the dating of certain features of these patterns. It is suggested that this method of CO<sub>2</sub> reconstruction may be developed further to extend the use of stomatal density studies to elucidate atmospheric CO<sub>2</sub> trends during earlier critical phases of the Earth's history, long pre-dating the ice core record. (Auth.)

#### I-56774

Narus, M.L., Schoenfelder, N.C., Na, Y., Chavasse, L.A., Dissekamp, R.S., **Chamber for laboratory studies of atmospheric aerosols and clouds**, *Review of scientific instruments*, Dec. 1996, 67(12), p.4364-4368, 16 refs.

A stainless-steel chamber has been constructed and interfaced to a Fourier transform infrared spectrometer for the purpose of studying laboratory simulated atmospheric aerosols and clouds applicable to the atmospheres of both polar regions. The chamber is cylindrical in design and is



comprised of a double-walled inner assembly that resides within an outer vacuum jacket. The chamber described here has been used to examine heterogeneous chemistry of solid powder samples. (Auth. mod.)

#### I-56794

Colacino, M., ed, Giovanelli, G., ed, Stefanutti, L., ed, Italian Research on Antarctic Atmosphere, 6th Workshop, Florence Nov. 6-8, 1995, **Conference proceedings of the Italian Research on Antarctic Atmosphere, Vol.51**, Bologna, Italian Physical Society, 1996, 383p., Refs. passim. For individual papers see E-56815, F-56812 through F-56814, I-56795 through I-56811, I-56816 through I-56826, K-56827, K-56828 or 51-2616 through 51-2629.

This is a collection of papers presented at the 6th Workshop of Italian Research on Antarctic Atmosphere, held Nov. 6-8, 1995, in Florence, Italy. It consists of 34 reports divided into 5 sections: 8 papers dealing with physics of the planetary boundary layer; 6 on meteorology and climatology; 7 on radiation, aerosols and clouds; 6 on physics and chemistry of the stratosphere; and 7 on instruments and measurement methodologies.

#### I-56795

Pettré, P., Murphy, B., **Study of the annual atmospheric cycle in the sector 90°E-180°E, East Antarctica**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.3-10, 9 refs.

The authors report on their study of the modulation of the annual atmospheric cycle in the Southern Hemisphere which is based upon a governing idea: the main observed modification concerns the Semi-Annual Oscillation of pressure which dominates the general circulation of the atmosphere in the high southern latitudes. The project's three main fields of investigation are discussed: the meridional temperature gradient through the mean troposphere between 60°S and 50°S; the effects of sea ice; and the large scale katabatic feedback.

#### I-56796

Viola, A., et al, **Boundary layer field experiment in the area of Terra Nova Bay, during the summer 1994-95**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.11-23, 14 refs.

To study the characteristics of the air flow in a confluence region, 2 measurement stations have been set up in the area of Terra Nova Bay during the summer 1994-95: one on the Reeves Nèvé (at 1200 m ASL) and another on the Nansen Ice Sheet. Both stations were equipped with a triaxial Doppler sodar and with several fast response sensors to evaluate the characteristics of the turbulent fluxes over a complex orographic area. In this work, the description of the experiment is given, and a first attempt to correlate different sensor measurements at the Nansen Ice Sheet station is presented. Good agreement is found between the wind measurements obtained by sodar and sonic anemometers. The differences recorded in the sonic anemometer and sodar momentum flux estimates need further investigation. (Auth.)

#### I-56797

Giostra, U., Cava, D., Cardillo, F., Tagliazucca, M., **Some characteristics of turbulence from summertime measurements over an antarctic ice sheet**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.25-38, 16 refs.

Turbulence measurements were made by fast response instrumentation over the ice sheet of a coastal region in Victoria Land during the summer of 1993-94. Turbulent fluxes of momentum, heat and water vapor were determined by the eddy correlation method. Daily cycle of some relevant turbulence quantities were investigated to determine the mean seasonal characteristics of the atmospheric boundary layer. It is prevalently stably stratified, the averaged heat flux is always negative and latent heat flux is positive but exchange processes are of limited extent being mostly inhibited by the low level of turbulence. Relevant deviations from this behavior were observed during katabatic wind episodes and free convection events. In the first case it is observed that the boundary layer stratification tends to become more neutral, temperature, downward heat and upward water vapor fluxes increase notably, and energy is stored inside the

snow. Unstable thermal stratification occurs only in 15% of cases; it is concentrated in the central hours of the day and often a rapid transition to free convection is observed. Sporadic cases were also observed in late evening and early morning hours. (Auth.)

#### I-56798

Georgiadis, T., et al, **Surface energy and radiation balances in Antarctica**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.39-44, 4 refs.

An experiment on surface energy and radiation balances was conducted during the 10th Italian expedition at the Reeves Glacier to correlate the surface balances with the formation and development of katabatic winds and to define the microclimatology of the site. An 'eddy-correlation' station equipped also with radiometers, thermocouples and a soil heat flux sensor recorded the radiative and energy components. The first analysis of the data showed a low amount of sensible and latent heat partition of the net radiation (few tens of W/m<sup>2</sup>). The main process which gains the major amount of the available surface energy is the heat transfer through the sub-surface medium (up to 80% of the net radiation value). The role of the cloud cover in triggering the surface balances is discussed, comparing situations of clear and cloudy skies. (Auth.)

#### I-56799

Argentini, S., Mastrantonio, G., Pettré, P., Viola, A., Gera, B.S., **Katabatic wind regime during 1993 and 1994 in Adélie Land, East Antarctica**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.45-51, 10 refs.

Buoyancy-driven flows have a fundamental role in shaping the surface wind field and forcing the large-scale tropospheric motions over the antarctic continent; the confluence zones of these downslope winds are concentrated along the coast. From Jan. 1993 until the end of Jan. 1995 a triaxial sodar was used at Dumont d'Urville Station to study the katabatic wind circulation in this area. The two-years measurements confirmed the results of studies showing that the katabatic winds have a main peak around 120°. The ABL thermal structure associated with the katabatic winds is most of the time characterized by a ground-based spiky layer of varying depth, depending on the intensity of the katabatic flow and the wind direction. A comparison between the 1993 and 1994 wind distributions has shown an easterly shift of the wind direction—associated with a light decrease of wind velocity—during 1994 that is attributed to synoptic pressure systems of different intensity. (Auth. mod.)

#### I-56800

Giostra, U., Strafella, R., **Statistical approach to stable boundary layer data analysis**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.53-61, 13 refs.

Data collected during the antarctic summer at Nansen Ice Sheet have been used to investigate the applicability of a method for statistical data analysis. The approach is likely to select stationary intervals in a time series. Statistical parameters are evaluated from the stationary intervals; estimations within a 10% relative error require a record of about half an hour for variance and kurtosis and a much longer record for 4th order moment. (Auth.)

#### I-56801

Sempreviva, A.M., Lavagnini, A., **Turbulence measurements at Hells Gate, Terra Nova Bay**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.63-74, 6 refs.

During the 10th Italian expedition in 1994-95 an experiment has been carried out at Hells Gate, a flat area around 20 km from the Terra Nova Bay Station. Hells Gate is located down-wind of the Nansen Ice Shelf, where the air masses coming from the Reeves and Priestley glaciers converge. In the central part of this area, 3 measuring points have been installed from the line of the continental ice up to 5 km inland. The objectives were to evaluate turbulent surface fluxes by using standard and fast response instruments to study the spatial variation of turbulence from the coast inland and to evaluate turbulent fluxes in cases of strong stability under the katabatic flow regimes. In this paper, the analysis of the data collected dur-



ing a twenty-day period in the central measuring point called IC05-02 are presented. Results have been compared with earlier studies of the same area. (Auth. mod.)

### I-56802

Tirabassi, T., **Mathematical software for the evaluation of turbulent fluxes in Antarctica**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.75-84, 10 refs.

Software is presented for evaluating the turbulent fluxes and characteristic parameters that govern the planetary boundary layer structure from elementary meteorological measurements. The software computes friction velocity, Monin-Obukhov length, temperature scale, specific humidity scale, surface stress, sensible heat flux and latent heat flux. Results of an application of the software in the characterization of the atmospheric boundary layer in the antarctic region are shown. (Auth.)

### I-56803

Frustaci, G., Pellegrini, A., **Katabatic signatures in AWS data along the northern Victoria Land coasts**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.87-110, 20 refs.

Several synoptic Automatic Weather Stations (AWS), deployed in the Terra Nova Bay region and along the coasts of the northern Victoria Land, are providing data to study antarctic climatology and weather phenomena. An analysis of wind, pressure and potential temperature was performed, based on an AWS data subset for the months of Jan., Feb. and Mar. Strong correlations were found between spatially widely located stations, and the mean values are in accordance with other regional AWS networks. This analysis gives evidence of marked differences between katabatic and non-katabatic events, both defined in terms of typical meteorological variables. A distinct signature has been found for katabatic cases not only in wind, but also in pressure and potential temperature data: the results are consistent with the mesocyclone activity originating from the baroclinicity existing between the cold continental katabatic air stream and the surrounding environment, which confirm limited-area model outputs. (Auth. mod.)

### I-56804

Meneguzzo, F., Bacci, G., Pellegrini, A., Giarola, S., Grippa, G., **On the role of upslope AWS data in forecasting downslope katabatic outbreaks at Terra Nova Bay, Antarctica**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.111-118, 9 refs.

Katabatic wind intensity short-term evaluations at Terra Nova Bay represent a major task for weather forecasting. Difficulties arise from a dramatic flow stratification in katabatic situations, which often leads to eminently laminar and decoupled fluxes in the vertical and vigorous turbulent exchanges. Some tentative approaches are outlined in this paper: a straightforward multi-regressive forecast and a forecast based on stochastic nature of time series of both upslope and downslope meteorological time series. The station *Eneide* was considered for katabatic wind intensity forecasting, while the station *Modesta* provided part of data for weather forecasting. Results derived by both type of analysis are shown, and their possible value is discussed. (Auth. mod.)

### I-56805

Della Vedova, A.M., Grigioni, P., De Silvestri, L., Sarao, R., **Preliminary climatological classification of long term automatic weather stations sites in north Victoria Land**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.119-132, 13 refs.

About 20 weather stations were deployed in northern Victoria Land by the National Antarctic Program of Italy and the United States. To give a climatic characterization of the area, temperature, relative humidity and wind recordings are analyzed. In order to identify homogeneous groups of stations, a cluster analysis method is carried out using the Gorczynski and Ivanow continentality indexes, and a climatological classification of the stations is proposed. The unsatisfactory comparison between this classification and the cluster analysis results points out the need for a different formula for the continentality index. The introduction of the percentage of

winds blowing from land is a possible solution to match the two analyses, considering the key role of the orographic features on antarctic wind regimes. (Auth. mod.)

### I-56806

Buzzi, A., Malguzzi, P., Cadelli, R., **Simulations of a low level jet over the antarctic region: 3-D diagnostics of potential vorticity**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.133-144, 19 refs.

The three-dimensional characteristics of an intense low level jet (LLJ) that develops in high resolution numerical simulations of airflow in the antarctic region are presented. The jet forms off Cape Adare and propagates in association with a cyclone present over the Ross Sea and the adjacent ocean. The LLJ is characterized by the presence of a barrier wind which blows parallel to the topographic barrier. However, the jet itself is distinct from the barrier wind, being characterized by speed values about twice as high. The jet formation appears to be strictly related to the orographic shape of the west coast of the Ross Sea, and in particular with the promontory inland of Cape Adare, which constrains the southerly flow to deviate to the east. By means of model output diagnostics and visualization tools, the three dimensional structure of the relevant meteorological fields associated with the LLJ are presented and discussed. The formation of a potential vorticity positive anomaly along the anticyclonic flank of the jet is investigated and hypotheses on the generation mechanisms are formulated. (Auth. mod.)

### I-56807

Fantini, M., **Quasi geostrophic moist baroclinic waves in three dimensional model: potential vorticity diagnostics**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.145-154, 15 refs.

This paper summarizes recent results by the author on moist baroclinic waves, which were published elsewhere, and extends the discussion of the results, presenting a diagnostic description based on potential vorticity. The connection of this work with antarctic research is based on the ubiquitous presence of mesosynoptic vortices over the antarctic ocean, for which a number of possible sources have been proposed. Foremost among them is a baroclinic energy source. (Auth. mod.)

### I-56808

Stortini, M., Morelli, S., Marchesi, S., **First approach on the use of Eta model in the antarctic region**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.155-159, 5 refs.

Some preprocessing and postprocessing characteristics of the Eta model are shown. The 1989 version preprocessing routines seem to be inadequate if the model runs in polar regions, where the horizontal interpolation procedure must be checked very carefully. New preprocessing routines have been developed and the application on a new horizontal interpolation is shown. New postprocessing routines, based on an operational version of Eta model, are also implemented. (Auth.)

### I-56809

Tomasi, C., Vitale, V., **Calculation of the Rayleigh scattering optical depth in the antarctic atmosphere**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.163-179, Refs. p.178-179.

Calculations of the Rayleigh optical depth at 37 selected wavelengths, within the 250 to 1600 nm spectral range, were performed using a modified version of a Rayleigh scattering computational program. The program was applied to 6 atmospheric models on the basis of profiles of air temperature and absolute humidity derived from 281 radiosoundings carried out at the Terra Nova Bay Station from 1987 to 1991. The results show that the Rayleigh optical depth changes at all wavelengths, from one 15-day period to another, in the summer season (Nov. to Feb.). The spectral values of the Rayleigh optical depth obtained for the mean thermodynamic conditions of the antarctic atmosphere observed in Jan. were found to be 1÷4 per mill smaller than those calculated for standard atmospheric models relative to other latitudes. Comparison of the present results with



those proposed by Penndorf (1957) for a standard mid-latitude atmosphere shows a systematic difference of about 1.3% at all wavelengths. (Auth. mod.)

### I-56810

Ciattaglia, L., Guerrini, A., Colombo, T., **Atmospheric CO<sub>2</sub> monitoring in an antarctic remote site: Jubany Station (South Shetland)**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.181-188, 5 refs.

The operation of a new atmospheric carbon dioxide measuring station is described. Jubany station is situated in the Antarctic Peninsula area and represents the third antarctic site making continuous measurements in accordance with the GAW (Global Atmospheric Watch) program of WMO. The first 2 years of hourly concentrations are examined and a preliminary selection of the data is shown. The records are remarkably smooth and no influences of anthropogenic or natural sources appear. (Auth.)

### I-56811

Mittner, P., Ceccato, D., Del Maschio, S., **Coarse fraction of tropospheric aerosol at Terranova Bay during the 1990-91 austral summer: feasibility of a principal component analysis of the multielemental data**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.189-210, 18 refs.

Aerosol sampling was performed at Campo Icaro, near the Terra Nova Bay Station, between Nov. 1990 and Feb. 1991. The duration of the sampling intervals was 12 hrs. The authors present the results of a statistical Principal Component Analysis (P.C.A.), for coarse fraction samples, obtained despite the low level of atmospheric concentrations and the short sampling intervals. Nine elements are used and two P.C.'s are required to explain 99.4% of total variance. With the exception of Fe, two distinct groups of elements contribute separately to each P.C.. Elements S, Cl, K, Ca, and Fe are strongly correlated with the 1st P.C., whereas Al, Si, Ti, Mn, and Fe are strongly correlated with the 2nd P.C. Comparison of elemental profiles with geochemical data suggests an interpretation of the two P.C.'s as "sea salt" (94.6% of the total variance) and "crustal". (Auth. mod.)

### I-56816

Keys, J.G., **Studies of reactive and reservoir chlorine and nitrogen in the antarctic stratosphere, using ground-based observations**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.269-278, 15 refs.

A review is given of antarctic ground-based measurements of stratospheric trace gases that are relevant to ozone depletion studies. Techniques and important results from these experiments are discussed. Emphasis is given to those experiments that have been conducted by NIWA, alone or in cooperation with the international partners. The principal stratospheric components that are discussed here are nitrogen and chlorine compounds, which have a special relevance in ozone depletion chemistry in Antarctica. Studies of extended time series of the column amounts of these molecules give insight into the heterogeneous chemical processes that dominate the antarctic springtime destruction of ozone. (Auth.)

### I-56817

Stefanutti, L., MacKenzie, R., Balestri, S., Adriani, A., Borrmann, S., Khattatov, V., **Airborne Polar Experiment (APE): state of the art**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.279-284, 2 refs.

An airborne campaign to investigate the role of Polar Stratospheric Clouds (PSCs) and background aerosols in the ozone depletion processes is reported. By means of the stratospheric aircraft M-55 Geophysika (Myasishchev Design Bureau), equipped with *in-situ* and remote sensing instrumentation, a more detailed study of the microphysics and chemistry of PSCs will be possible. The main stages of the project are described. (Auth. mod.)

### I-56818

Adriani, A., et al, **In situ observations of aerosol and Polar Stratospheric Clouds by balloon-borne and airborne laser backscatter sondes**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.285-292, 7 refs.

Two balloon-borne devices for optical probing of the atmosphere are described: one is able to measure optical properties of stratospheric aerosols, the other is capable of assessing their dimensional distribution. Compared results are reported. A third airborne device, still under development, is also presented. (Auth.)

### I-56819

Stefanutti, L., et al, **Lidar observation of PSCs in the Arctic and Antarctic**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.293-309, 12 refs.

Polar Stratospheric Clouds and aerosols were monitored in Antarctica and in the Arctic from 1989 to 1995 and include the pre-Pinatubo, the Pinatubo and after-Pinatubo period. Non-depolarizing PSCs and warm depolarizing aerosols are discussed. Non-depolarizing PSCs have been observed over Dumont d'Urville Station during the POLE experiment (1989-1995) and over Sodankyla during SESAME. (Auth. mod.)

### I-56820

Di Donfrancesco, G., Adriani, A., **Stratospheric temperatures during 93 and 94 above McMurdo Station, Antarctica**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.311-318, 16 refs.

Stratospheric temperatures were measured by Rayleigh lidar at McMurdo Station, during the period Mar.-Oct. in 1993 and 1994. The winter stratosphere was found to be active, with one major and several minor warmings occurring in the two years of observations. In such events the expected behavior of a distinct region of high temperatures, formed in the polar mesosphere, descending with time and warming the stratopause region, was observed. Only in mid-winter of 1994, the stratopause temperatures reached a relative maximum, contrary to what is expected from radiative arguments alone. Other differences between the two years, in terms of time development of average temperature in different stratospheric layers, are pointed out. (Auth.)

### I-56821

Rafanelli, C., Valenti, C., Di Menno, M., Luttazzi, C., **Brewer measurements in Ushuaia austral springs 1994-1995**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.319-325, 6 refs.

Preliminary results, obtained during two ozone-measurement campaigns in austral springs of 1994 and 1995, are presented. Methods and instruments used are described. Data analysis shows that during the austral spring the ozone hole has a duration of about 15 days; the UV radiation measurements show an increase of erythemal irradiance during the hole's duration. (Auth. mod.)

### I-56822

Anav, A., Di Menno, I., Moriconi, M.L., Cardillo, F., **UV radiation determinations at Terra Nova Bay**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.329-334, 6 refs.

During the 10th measurement campaign of the Italian P.N.R.A., an UV-A and an UV-B pyranometer of the Yankee Environmental Systems, Inc. has been added to the instrumental set used in the past year, and a new data acquisition system replaced the old one. In this work, a comparison between the UV-A irradiances as measured by the old and the new radiometer, and an example of the behavior of the UV-B irradiance during ten days of measurement, are reported. (Auth.)

### I-56823

Guzzi, D., Stefanutti, L., **Ocular hazard from side-scattered radiation by cirrus and polar stratospheric clouds**, Italian



Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.335-341, 5 refs.

A link at high latitudes between ozone losses and the conversion of inorganic chlorine toward reactive forms, by means of polar stratospheric clouds (PSC), is discussed. An airborne campaign for the study of the PSCs is proposed: a high-flying research aircraft, the Geophysica (M-55), would provide the platform for making the measurements at heights between 7 and 22 km; a Lidar would be used to study particle size distribution and shape. Since the Lidar would be placed in front of the pilot at a distance of about 200 cm from the cockpit, the possibility of damage to the pilot's eyes from the side-scattered laser radiation is considered.

#### I-56824

Mittner, P., Buso, P., Ceccato, D., Agostini, S., **Inertial impactor for Antarctica: preparation and handling of samples and aerosol collection efficiency**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.343-349, 3 refs.

A multiannual experiment on tropospheric aerosol, carried out during several summer campaigns at Campo Icaro, near Terra Nova Bay Station, is reported. The experiment is characterized by long continuous sequences of short duration (12h) samplings, in condition of low aerosol volume concentrations and, therefore, low sample areal density. A special instrument, "IIA" (Inertial Impactor for Antarctica) has been designed to meet the requirements of the experiment. The relevant features, technical procedures and results are described. (Auth. mod.)

#### I-56825

Chiminello, F., Mittner, P., Ceccato, D., **Use of redundancy in multielemental PIXE measurements of aerosol samples in conditions of low signal to background ratio: removal of anomalous data, subtraction of background and determination of the errors**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.351-360, 6 refs.

An experiment on tropospheric aerosols, based on multielemental PIXE analysis of a large number of aerosol samples collected at the Terra Nova Bay Station, is characterized by redundancy in elemental measurements. Redundancy, together with the use of a set of 'blank' data (to obtain information on the background, related to membrane impurities, as well as to contaminations and other sources of anomalous data), allow (at least for the fine fraction) three basic operations: estimate of the average background level and of an effective detection limit for each element; rejection of anomalous aerosol data with a low loss of those data used in the subsequent analyses required by the experiment; and direct estimate of average errors on elemental areal densities of the aerosol samples. (Auth.)

#### I-56826

Ori, C., Giovanelli, G., Lenaz, R., Colombo, T., **Atmospheric CO<sub>2</sub> concentration measured continuously from the Mediterranean to the Bellingshausen Sea: technology and methodology**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.361-367, 7 refs.

This paper describes the methodology used during the EOLO 94 cruise for continuous CO<sub>2</sub> measurement in a hemispheric course. The SIEMENS ULTRAMAT 5E analyzer was mounted in a thermostatic box fitted on shock-absorbing supports; a two-stage freezing unit, that could go below -55°C and sustain measuring operations for at least 5 to 24 hours depending on humidity percentage, was assembled. Twenty minutes were sufficient for the replacement of the trap when the air flow was obstructed by the ice from frozen humidity. The very low temperature was reached by using a two-stage refrigerator system: the first, a traditional compressor unit (to -30°C); the second, a big Peltier cell able to lower the temperature to -55°C. The actual working temperature of the two systems was monitored by a real time data logger. (Auth.)

#### I-56838

Machida, T., Nakazawa, T., Narita, H., Fujii, Y., Aoki, S., Watanabe, O., **Variations of the CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O concentrations and  $\delta^{13}\text{C}$  of CO<sub>2</sub> in the glacial period deduced from an**

**antarctic ice core, south Yamato**, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.10, Tokyo, National Institute of Polar Research, 1996, p.55-65, Refs. p.64-65.

To reconstruct variations of atmospheric greenhouse gases in the glacial period, air in an ice core recovered from a bare ice field in the Queen Fabiola Mountains was extracted and the CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O concentrations, and  $\delta^{13}\text{C}$  of CO<sub>2</sub>, were analyzed. The CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O concentrations were lower than the pre-industrial Holocene values, suggesting that this ice core was formed in the glacial period. The variations of the CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O concentrations during the glacial period showed a good correlation with that of  $\delta^{18}\text{O}$  of ice from the core. The CO<sub>2</sub> concentrations varied almost opposite in phase with  $\delta^{13}\text{C}$ , which implies that CO<sub>2</sub> with isotopically light carbon was added to or subtracted from the atmosphere in the glacial period. (Auth.)

#### I-56841

Naito, N., Muramatsu, H., **Preliminary analysis of temperature changes due to synoptic scale disturbances at Syowa Station, Antarctica in winter**, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.10, Tokyo, National Institute of Polar Research, 1996, p.82-91, 10 refs.

The antarctic surface air temperature often increases severely in winter when a synoptic scale disturbance comes close and then decreases after it goes away. The mechanism of these temperature changes is analyzed from the data observed at Showa Station in 1993. The magnitude of changes in temperature due to destruction or reformation of the surface temperature inversion during 15 events is estimated from comparison of the vertical temperature profiles above Showa Station before and after each event. The horizontal advection of sensible heat is calculated from the thermal wind shear relation. It is shown that the horizontal advection of warm and cold air are observed in the warming and the cooling events, respectively. It is estimated from the average heat budget that there should be an upward current of 0.2 to 0.8/cm/s during the warming events and a downward current of less than 0.4 cm/s during the cooling events in the 850 to 300 hPa layer. (Auth. mod.)

#### I-56842

Murayama, S., et al, **Measurements of the oxygen isotopic ratio of atmospheric CO<sub>2</sub> at Syowa Station, Antarctica**, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.10, Tokyo, National Institute of Polar Research, 1996, p.92-101, 18 refs.

Ground-based and aircraft measurements of the  $\delta^{18}\text{O}$  of atmospheric CO<sub>2</sub> were made at Showa Station during 1989 and 1990. To minimize the possibility of exchange of oxygen atoms between CO<sub>2</sub> and water during storage in sampling flasks, CO<sub>2</sub> was extracted from each air sample at the station within a few days of its collection. The maximum of the seasonal  $\delta^{18}\text{O}$  cycle at the station appeared in summer and the minimum in winter. The peak-to-peak amplitude of the cycle was 0.27 per mill.  $\delta^{18}\text{O}$  of CO<sub>2</sub> was slightly lower in the upper troposphere than in the middle and lower troposphere over the station during the measurement period. From a comparison of the CO<sub>2</sub> measurements at and over Showa Station and  $\delta^{18}\text{O}$  at other stations, it is suggested that seasonally dependent atmospheric transport to the antarctic region is one of the important processes determining the seasonal cycle and the height variation of  $\delta^{18}\text{O}$  of CO<sub>2</sub> at the station. (Auth. mod.)

#### I-56843

Miura, K., Nakae, S., Matsuda, K., Tsuge, N., Aoki, K., **Size distribution of aerosol particles over the western Pacific Ocean and the Southern Ocean**, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.10, Tokyo, National Institute of Polar Research, 1996, p.102-110, 16 refs.

Aerosol concentrations and size distribution for large and giant particles were measured at a fixed station at 64-65.5°S, 140°E in Dec. 1994 and Jan. 1995. The concentrations of Aitken particles at the fixed station were somewhat higher than those measured around 10°N latitude, and showed a distinct diurnal variation. For large and giant particles, the authors confirmed the effect of wind force on the size distribution over the southern ocean. Results suggest that the principal constituents of particles over the southern ocean in summer are sulfur-dominant Aitken particles and sea-salt large particles. (Auth. mod.)



**I-56844**

Osada, K., **Methanesulfonate and non-sea-salt sulfate in drifting-snow from east Queen Maud Land, East Antarctica**, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.10, Tokyo, National Institute of Polar Research, 1996, p.111-118, 32 refs.

Drifting-snow samples were collected at Mizuho Station from Feb. to Sep. 1986, and along traverse routes in eastern Queen Maud Land from Oct. 1986 to Jan. 1987. Variability in the methanesulfonate (MSA) and non-sea-salt (nss)  $\text{SO}_4^{2-}$  concentration levels suggests a seasonal relationship: high in summer and low in winter. The ratios of  $\text{nssSO}_4^{2-}/\text{MSA}$  concentrations show a weak inverse seasonal relationship. The concentration levels of  $\text{nssSO}_4^{2-}$  correlate well with MSA concentration levels in the Mizuho Station samples, suggesting that the dominant source of the  $\text{nssSO}_4^{2-}$  and MSA deposited in this region is marine biogenic dimethylsulfide. The  $\text{nssSO}_4^{2-}/\text{MSA}$  ratios from the traverse samples are significantly higher and deviate widely from the Mizuho Station regression line, implying a non-biogenic natural source for the  $\text{nssSO}_4^{2-}$  at higher-elevation inland locations. (Auth.)

**I-56854**

Bui Van, N.A., De Assis Quintão, D., Leite, J.M., **Effects of polar air on meteorological profiles of mid latitudes** [Influência do ar polar no perfil meteorológico das regiões de latitude média], *Boletim de geografia teórica*, 1993, 23(45-46), p.131-136, In Portuguese with English summary.

Data analysis of soundings performed by different meteorological stations in South America and collected by the Meteorological Research Institute (IPMet) of the State University of São Paulo (UNESP-Bauru), allow to determine the vertical meteorological profiles at different latitude. These profiles reveal the existence of a double tropopause which propagates from the Antarctic to the mid-latitude regions, permitting the intrusion of polar air, rich in ozone into these regions. This propagation suggests a transport mechanism of ozone in the high atmosphere. (Auth.)

**I-56855**

Bian, L.G., Lu, L.H., Jia, P.Q., **Preliminary study on the ultraviolet radiation in Zhongshan Station, Antarctica**, *Chinese science bulletin*, Nov. 1996, 41(21), p.1811-1814, 3 refs.

The decreasing amount of ozone in the Antarctic causes an increase in ultraviolet radiation reaching the surface; this change has a significant effect on the polar biosphere and on the global ecosystem. Since 1993, radiation and ozone measurements were carried out at Zhongshan Station as part of the program of the Chinese Antarctic Research Expedition. In this note, the character of the ultraviolet and global radiation from Feb. 1993 to Dec. 1994 are analyzed; the relation between the decrease of antarctic ozone in spring and the ultraviolet and global radiation is discussed. (Auth. mod.)

**I-56862**

De Mora, S.J., Wylie, D.J., Dick, A.L., **Methanesulphonate and non-sea salt sulphate in aerosol, snow and ice on the East Antarctic plateau**, *Antarctic science*, Mar. 1997, 9(1), p.46-55, Refs. p.54-55.

This investigation reports the first simultaneous measurement of methanesulphonate (MSA) and non-sea salt sulphate (NSSS) in aerosols, surface snow, and ice core samples for a continental site in Antarctica (78°S, 139°E, elevation 2849 m). Aerosol MSA concentrations ranged from 0.09-0.43 nmol/m<sup>3</sup> STP (median 0.14 nmol/m<sup>3</sup>) and were generally lower than those observed at coastal antarctic sites. NSSS concentrations varied from 0.66-1.32 nmol/m<sup>3</sup> STP (median 0.88 nmol/m<sup>3</sup>), comparable to those reported for other continental antarctic locations. Whereas the MSA:NSSS molar ratio in aerosol samples was in the range 12.7-32.5% (median 17.0%), the ratio down a snow pit and ice profile varied from 1.14-55.6% (median 3.50%), reflecting the variability to be expected over a period of a decade. The chemical composition and low MSA content suggests an origin of aerosols consistent with long range transport from mid-latitudes. (Auth.)

**I-56867**

Leonard, S., Turner, J., Milton, S., **Assessment of UK Meteorological Office numerical weather prediction analyses and forecasts for the Antarctic**, *Antarctic science*, Mar. 1997, 9(1), p.100-109, 24 refs.

The performance of the UK Meteorological Office operational numerical weather prediction system in the Antarctic is examined. The analysis/forecast model currently has a reasonable representation of the atmospheric circulation, although there are some problems. During the first three days of the forecasts the katabatic winds in the coastal region become too strong compared to those in the initial fields; however, the pattern of katabatic winds across the continent is broadly correct. The forecast tropospheric temperatures are generally too cold, although positive errors are found inland of the coast in the region of descent associated with the katabatic wind circulation. The mean forecast low pressure centers within the circumpolar trough are in approximately the correct locations. During Jan. there is good agreement between the model total cloud amount over the Antarctic and the estimates of total cloud cover from *in situ* observations. However, in July the model has too much cloud. There is no significant change in the amount of cloud during the first three days of the forecasts. The model has a good representation of the broadscale field of snow accumulation across the Antarctic. A comparison of various 6 hour forecast model fields against observations confirms the errors noted in the three-day forecasts when compared against analyses. (Auth. mod.)

**I-56874**

Bergamaschi, P., et al, **Implications of the large carbon kinetic isotope effect in the reaction  $\text{CH}_4 + \text{Cl}$  for the  $^{13}\text{C}/^{12}\text{C}$  ratio of stratospheric  $\text{CH}_4$** , *Geophysical research letters*, Aug. 15, 1996, 23(17), p.2227-2230, 30 refs.

In order to assess the effect of the exceptionally large  $\text{KIE}_{\text{Cl}}$  on  $\delta^{13}\text{C}$  of stratospheric  $\text{CH}_4$  the authors applied a two-dimensional, time dependent chemical transport model. The model results demonstrate the strong influence of the  $\text{CH}_4 + \text{Cl}$  reaction on  $\delta^{13}\text{C}_{\text{CH}_4}$  in particular in the middle and upper stratosphere, where this reaction contributes several tens of percent to the total  $\text{CH}_4$  sink. The Cl sink helps to explain the relatively large overall isotope fractionation of 1.010-1.012 observed in the lower stratosphere, even though the model results predict a smaller effect than observed. Measurements extending from about 65°-85°S to 85°N are depicted in accompanying figures and discussed in the text. (Auth. mod.)

**I-56875**

Aellig, C.P., et al, **Latitudinal distribution of upper level ClO as derived from space borne microwave spectroscopy**, *Geophysical research letters*, Aug. 15, 1996, 23(17), p.2321-2324, 16 refs.

Latitudinal distributions of upper stratospheric ClO measured by MAS during the three ATLAS missions are presented for Northern Hemisphere (NH) spring equinox in 1992, Southern Hemisphere (SH) early fall in 1993, and NH fall in 1994. The MAS ClO results are shown along with correlative MLS observations. The results of both instruments consistently show the same latitudinal features. The ClO maximum in the NH spring occurs at mid-latitudes, whereas the latitudinal ClO maximum in both the NH and SH fall occurs at high latitudes. The volume mixing ratio maxima were significantly higher in the fall (0.7-0.8 ppbv) than in spring (0.5-0.6 ppbv). Qualitatively, these results are consistent with calculations of several 2-D models. (Auth.)

**I-56880**

Clavier, B., **Calms and storms of the southern ocean** [Calmes et tempêtes de l'océan Austral], *La technique moderne*, 1993, 85(10-12), p.37-42, In French. 4 refs.

The behavior of semi-permanent anticyclones and depressions over the antarctic region, extending to the vicinity of latitude 35°S is summarized and illustrated with a winter solstice weather map of isobars and fronts, and a composite infrared image assembled from about 15 passes of the NOAA-7 satellite (June 22, 1983). The three systems of circulation giving rise and decay to low-pressure fronts over the South Atlantic, Indian and South Pacific oceans are described. The production of calms and storms by breakaways from the subtropical anticyclone, persisting for several days, is explained with the effects of asymmetry of the continent having its center offset northwards towards the Indian Ocean. An appendix draws an analogy between the circulations of relatively warm and cold air and seawater within the region.



**I-56883**

Komhyr, W.D., Crozer, E.A., Lathrop, J.A., Winey, M.A., **ECC ozonsonde observations at South Pole, Antarctica, during 1989**, *U.S. National Oceanic and Atmospheric Administration. Climate Monitoring and Diagnostic Laboratory. Data report*, June 1990, NOAA-DR-ERL-CMDL-5, 247p., PB90-258914, Refs. p.5-7.

Atmospheric ozone vertical distributions, air temperatures, and wind speed and wind direction data are presented for 60 balloon electrochemical concentration cell (ECC) ozonsonde soundings made at the Amundsen-Scott Station in 1989. (Auth)

**I-56887**

Neuendorffer, A.C., **Ozone monitoring with TIROS-N operational vertical sounders**, *Journal of geophysical research*, Aug. 20, 1996, 101(D13), p.18,807-18,828, 41 refs.

The potential for using the TIROS-N operational vertical sounder (TOVS) on NOAA polar-orbiting weather satellites to monitor stratospheric ozone is examined. TOVS 9.7- $\mu$ m high resolution infrared sounder (HIRS) ozone channel is particularly well suited for monitoring the lower stratospheric ozone layer. A 3 Dobson unit drop in lower stratospheric ozone produces a measurable (i.e.,  $\approx 0.2^\circ\text{C}$ ) increase in HIRS 9.7- $\mu$ m brightness temperatures even in the vicinity of Antarctica. A two-layer physical retrieval algorithm is presented that uses the TOVS HIRS 9.7- $\mu$ m signal to determine lower stratospheric ozone and to estimate total ozone. Trend analysis of TOVS ozone confirms the fact that there have been significant losses of lower stratospheric ozone in the spring equinox extratropics of both hemispheres. Much of this loss persists into the summer solstice time period. Data is shown for both northern and southern polar regions. (Auth. mod.)

**I-56888**

Santee, M.L., et al, **Chlorine deactivation in the lower stratospheric polar regions during late winter: results from UARS**, *Journal of geophysical research*, Aug. 20, 1996, 101(D13), p.18,835-18,859, 95 refs.

Time series of vortex-averaged mixing ratios are calculated on two potential temperature surfaces (585 K and 465 K) in the lower stratosphere for approximately month-long intervals during late winter: Aug. 17-Sep. 17, 1992, in the Southern Hemisphere and Feb. 12-Mar. 16, 1993, in the Northern Hemisphere. The observed mixing ratios are adjusted for the effects of vertical transport using diabatic vertical velocities estimated from CLAES tracer data. In the Northern Hemisphere, the decrease in  $\text{ClO}_x$  is balanced on both surfaces by an increase in  $\text{ClONO}_2$ . In the Southern Hemisphere, continuing polar stratospheric cloud activity prevents  $\text{ClO}$  from undergoing sustained decline until about Sep. 3. In contrast to the Northern Hemisphere, there is no significant chemical change in vortex-averaged  $\text{ClONO}_2$  at 465 K, and there is an apparent decrease in  $\text{ClONO}_2$  at 585 K, even after the enhanced  $\text{ClO}$  abundances have started to recede. Results from the SLIMCAT chemical transport model initialized with UARS data and run with  $\text{OH} + \text{ClO} \rightarrow \text{HCl} + \text{O}_2$  as an 8% channel suggest that the primary recovery product in the south during this time period is not  $\text{ClONO}_2$ , but HCl. HALOE HCl mixing ratios are extrapolated back to the time of the MLS and CLAES data. (Auth. mod.)

**I-56890**

Lobert, J.M., Yvon-Lewis, S.A., Butler, J.H., Montzka, S.A., Myers, R.C., **Undersaturation of  $\text{CH}_3\text{Br}$  in the Southern Ocean**, *Geophysical research letters*, Jan. 15, 1997, 24(2), p.171-172, 7 refs.

Dry mole fractions of methyl bromide ( $\text{CH}_3\text{Br}$ ) in marine boundary layer air and in air equilibrated with surface water were measured in the southern ocean. Saturation anomalies were consistently negative at  $-36 \pm 7\%$ . The observed undersaturations do not support recently published predictions of highly supersaturated antarctic waters, but instead suggest a net uptake of atmospheric  $\text{CH}_3\text{Br}$  by cold, productive oceans. The observations do not appear to be supported by known chemical degradation rates and present strong evidence for an unidentified, oceanic sink mechanism such as biological breakdown. The authors' estimate for the global, net, oceanic sink for atmospheric methyl bromide remains negative at  $-21$  ( $-11$  to  $-32$ ) Gg/y. (Auth.)

**I-56891**

Shaffer, J.A., Cervený, R.S., Balling, R.C., Jr., **Polar temperature sensitivity to lunar forcing?**, *Geophysical research letters*, Jan. 1, 1997, 24(1), p.29-32, Refs. p.31-32.

The authors conduct an empirical study of polar sensitivity to climate forcing by comparing a high-quality, 17-year satellite-derived dataset of daily temperatures for  $2.5^\circ$  latitudinal bands to a known external forcing mechanism, the lunar phase cycle. The earth's polar regions display a temperature range of greater than  $0.55^\circ\text{C}$  over the course of a synodic (29.53 day) month. This lunar-influenced range in temperature is 25 times larger than a similarly computed range in aggregated global temperatures over a synodic month. Temperature variations between the polar and non-polar regions also produce a pronounced temporal shift in sensible heat transfer. Strong poleward transfer of heat dominates near the full moon but the transfer substantially weakens near the new moon. It is unlikely that this sensitivity can be explained by the type of polar forcing previously identified in GCM simulations and paleoclimatic reconstructions, because of the short duration of the lunar cycle. However, it does demonstrate a new and potentially important external influence on the polar regions' climates. (Auth. mod.)

**I-56892**

Imre, D.G., Xu, J., Tridico, A.C., **Phase transformations in sulfuric acid aerosols: implications for stratospheric ozone depletion**, *Geophysical research letters*, Jan. 1, 1997, 24(1), p.69-72, 37 refs.

Activation reactions of benign chlorine species ( $\text{HCl}$ ,  $\text{ClONO}_2$ ) on aerosols in the winter polar stratosphere set the stage for the spring-time catalytic destruction of ozone leading to the antarctic ozone hole. Field observations have demonstrated the existence of both solid and liquid particles consisting of  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$ , and  $\text{H}_2\text{O}$ . The exact freezing conditions and final composition of the solid aerosols remain the subject of investigations. The authors present laboratory observations of isolated individual sulfuric acid/water particles under stratospheric temperatures and water vapor pressures. The experiments demonstrate that this binary system would not freeze unless temperatures were below the water-ice frost point. Upon freezing, the authors observe  $\text{H}_2\text{SO}_4 \cdot 8\text{H}_2\text{O}$ , not the generally invoked  $\text{H}_2\text{SO}_4 \cdot 4\text{H}_2\text{O}$ . It is suggested that the water-rich octahydrate phase is likely to be one of the high relative humidity forms which is efficient in chlorine activation. (Auth.)

**I-56893**

Portniagin, I.U.I., Forbes, J.M., Makarov, N.A., **Unusual characteristics of lower thermosphere prevailing winds at South Pole**, *Geophysical research letters*, Jan. 1, 1997, 24(1), p.81-84, 7 refs.

Meteor radar measurements of meridional winds near 95 km altitude, along four orthogonal azimuth directions approximately  $2^\circ$  from the geographic South Pole, were made between Jan. 19, 1995, and Jan. 26, 1996. The authors report analyses of the prevailing (daily mean) wind component covering the period from Jan. 19 through June 20, 1995. The observed phenomena include: a regular month-to-month migration in the phase of the  $s=1$  quasi-stationary component of the wind field; during Apr., a 10-day period of strong net wind divergence from the pole; and evidence for upwelling associated with very high magnetic activity. It is speculated that the wind divergence event may be associated with the mesospheric penetration of momentum fluxes known to accompany intense wave 1 activity in the Southern Hemisphere during Apr. (Auth.)

**I-56897**

Nardi, B., Deshler, T., Hervig, M.E., Oolman, L.D., **Ozone measurements over McMurdo Station, Antarctica during spring 1994 and 1995**, *Geophysical research letters*, Feb. 1, 1997, 24(3), p.285-288, 14 refs.

Ozone and temperature profiles were measured with balloon-borne instruments over McMurdo Station from late Aug. to late Oct. in 1994 and in 1995. Minimum column ozone values of 138 DU and 139 DU were measured, reduced from initial measurements in late Aug. of 272 DU and 256 DU, respectively. These minima are higher than the record low measurement from McMurdo taken in Oct. 1993 (130 DU), but lower than all other years since 1986 when ozone measurements were initiated at McMurdo. In 1994 and 1995, as in previous years, the onset of ozone recovery began



mid-to-late Oct. above 20 km. Below 14 km ozone concentrations have returned to pre-Pinatubo levels. Between 16-22 km they are near, and in 1995 often lower than, the record low levels set in 1993. In late Aug. of 1995, the total and 12-20 km column ozone were also often observed to be near or lower than that for the same period of all previous years since 1986. By early Oct. 1995, almost complete ozone depletion was experienced uniformly over the altitude region 14.5-19.5 km. (Auth.)

#### I-56898

McPeters, R.D., Labow, G.J., **Assessment of the accuracy of 14.5 years of Nimbus 7 TOMS Version 7 ozone data by comparison with the Dobson network**, *Geophysical research letters*, Dec. 15, 1996, 23(25), p.3695-3698, 11 refs.

A Version 7 algorithm and calibration have been applied to the 14.5 year Nimbus 7 TOMS ozone record (1978-1993). The ozone retrieval algorithm has been significantly improved for cloudy conditions and for high solar zenith angles, and the radiative transfer used in the algorithm is more accurate. New calibration techniques have been used that produce a very stable data set even after 1990 when TOMS degradation became significant. TOMS ozone now agrees with average ozone from an ensemble of 30 Northern Hemisphere ground stations (Dobsons and Brewers) to within 1% throughout most of the 14.5 year record. The time-dependent drift relative to Dobson is 0.29% per decade through the end of the data record. There is almost no solar zenith angle dependence in the comparison for angles below about 80°, but data should be used with caution for larger solar zenith angles. There is also a residual total ozone dependence in the TOMS-Dobson difference, of about 1% per 100 DU. (Auth.)

#### I-56899

McPeters, R.D., Hollandsworth, S.M., Flynn, L.E., Herman, J.R., Seftor, C.J., **Long-term ozone trends derived from the 16-year combined Nimbus 7/Meteor 3 TOMS Version 7 record**, *Geophysical research letters*, Dec. 15, 1996, 23(25), p.3699-3702, 15 refs.

Ozone measurements from the Nimbus 7 TOMS instrument, which operated from Nov. 1978 through early May 1993, have been extended through Dec. 1994 using data from the TOMS instrument on-board the Russian Meteor 3 satellite. Both TOMS data records have recently been recalibrated, and then reprocessed using the Version 7 retrieval algorithm. Long-term trend estimates obtained from a multiple regression analysis show ozone losses in the extended data record similar to those reported in previous studies using Version 6 TOMS and SBUV data, and ground-based Dobson data. Ozone continues to decline through the end of 1994, with the most significant ozone losses occurring in the high southern latitudes during Oct. (-20% per decade) and in the northern mid- to high-latitudes during Mar./Apr. (-6 to -8% per decade). There is no significant ozone trend in the tropics. Annual-average trends derived from the Nimbus 7 Version 7 data are 0-2.5% per decade less negative than those derived over the same time period using Version 6 data. (Auth.)

#### I-56907

Tuck, A.F., et al, **Brewer-Dobson circulation in the light of high altitude *in situ* aircraft observations**, *Royal Meteorological Society. Quarterly journal*, Jan. 1997 Part A, 123(537), p.1-69, Refs. p.63-69.

Fast response *in situ* measurements of a suite of chemical species made from the NASA ER2 high altitude aircraft, between 60°N and 70°S at potential temperatures up to 530 K from Mar. to Nov. 1994 at longitudes 115°W to 150°E, are considered for the view they offer of the Brewer-Dobson circulation in the lower stratosphere and upper troposphere. In the Southern Hemisphere, where most of the flights occurred, comparisons are made with measurements taken in Aug./Sep. 1987 at longitudes 120°W to 60°W to examine temporal and longitudinal differences. Interpretations made suggest conceptual modifications to the simple construct of advection in a two-dimensional long-term mean. (Auth.)

#### I-56909

Liu, Z., Bromwich, D.H., **Dynamics of the katabatic wind confluence zone near Siple Coast, West Antarctica**, *Journal of applied meteorology*, Feb. 1997, 36(2), p.97-118, 46 refs.

The force balances inside the confluence zone are here investigated for three situations: mean (all available wind profiles from balloon launches), and two extreme cases (light and strong winds). A linear regression method is used to estimate the mean vertical wind shears and horizontal temperature gradients. The vertical wind shears are used to examine whether or not the airflows are in geostrophic balance. The results are 1) the airflow above the surface at both sites is in geostrophic balance for the three situations; 2) inside the west antarctic katabatic wind zone, there are three forces in the north-south direction—the restoring pressure gradient force associated with blocking of the katabatic and synoptic winds, the downslope buoyancy force, and the synoptic pressure gradient force associated with the time-averaged low in the South Pacific Ocean; 3) above the west antarctic katabatic wind layer, the observed easterly wind is due to the synoptic pressure gradient force associated with the low; 4) inside the east antarctic katabatic wind zone, in addition to the above three forces, there is the downslope buoyancy force associated with the inversion; and 5) large-scale transient synoptic systems strongly influence the downslope wind speed and the boundary layer depth, resulting in the light and strong wind cases. (Auth. mod.)

#### I-56939

Bintanja, R., Jonsson, S., Knap, W.H., **Annual cycle of the surface energy balance of antarctic blue ice**, *Journal of geophysical research*, Jan. 27, 1997, 102(D2), p.1867-1881, 42 refs.

A 15-month meteorological data set was obtained from an automatic weather station over a blue ice area in Queen Maud Land. The meteorological measurements are used as input for a surface energy balance model in order to compute the hourly varying surface fluxes and the (sub)surface temperatures to a depth of 10 m. The model reproduces reasonably well the directly measured temperatures in the upper meter of ice. Model results show that the net shortwave radiation is the largest positive term in the annual mean energy budget (42.2 W/m<sup>2</sup>). Other positive fluxes are the downward sensible heat flux (12.1 W/m<sup>2</sup>) and the upward subsurface energy flux (0.2 W/m<sup>2</sup>). Energy is lost by net longwave radiation (-49.1 W/m<sup>2</sup>) and the upward directed latent heat flux (-5.0 W/m<sup>2</sup>). An analysis is made of the annual cycle of the surface heat fluxes on the basis of daily, monthly, and seasonally mean values. In addition, there are calculations of the surface energy budget for two distinctly different weather regimes, which are typical for this region. Finally, it is demonstrated that the annual cycle of the turbulent fluxes can be explained in terms of the limiting values of the Bowen ratio. (Auth. mod.)

#### I-56940

Debrestrian, D.J., et al, **Analysis of POAM II solar occultation observations of polar mesospheric clouds in the southern hemisphere**, *Journal of geophysical research*, Jan. 27, 1997, 102(D2), p.1971-1981, 21 refs.

The authors report on the detection of polar mesospheric clouds (PMCs) in the high-latitude Southern Hemisphere by POAM II during the 1993 and 1994 summer seasons. These measurements are noteworthy because they are the first measurements of PMCs in atmospheric extinction. The POAM II PMC data set has been analyzed using a simple geometric cloud model. The authors found that mean cloud altitudes deduced from these data are 82-83 km, consistent with previous ground-based and satellite measurements. In addition, the 0.7 km vertical resolution of POAM II allows for accurate determination of cloud thickness. For the PMCs detected by POAM II they found a mean thickness of 2.4 km. The multichannel capability of POAM II also makes it possible to study the wavelength dependence of the measured slant optical depth for the clouds with largest extinction. The results of this analysis suggest an upper limit to the modal particle radii for these clouds of approximately 70 nm. (Auth. mod.)

#### I-56941

Warren, S.G., Thomas, G.E., Hernandez, G., Smith, R.W., **Noctilucent cloud observed in late April at South Pole Station: temperature anomaly or meteoric debris**, *Journal of geophysical research*, Jan. 27, 1997, 102(D2), p.1991-2000, 49 refs.

A sunlit cloud was observed near the horizon at Amundsen-Scott Station (90°S), four months after summer solstice in 1992, at a solar depression angle of 14.6°. The angular location of the transition from sunlit to twilight cloud in the photograph establishes the cloud height at about 80 km. The cloud extended horizontally at least from 81° to 85°S and from 40°W



to 20°E. The probable origin of this cloud by formation of water-ice crystals near the mesopause suggests that mesospheric temperatures occasionally deviate by at least 70 K from their climatological means. An alternative explanation that the cloud was a debris cloud formed by disintegration of a reentering man-made satellite is ruled out. A debris cloud from an entering meteoroid is a possible explanation but would be unprecedented. Hydroxyl airglow emissions at the south pole in May give a frequency of 1% for mesopause temperatures below 155 K, consistent with the rarity of out-of-season sightings of noctilucent clouds in Antarctica. (Auth.)

#### I-56947

James, T.S., Ivins, E.R., **Global geodetic signatures of the antarctic ice sheet**, *Journal of geophysical research*, Jan. 10, 1997, 102(B1), p.605-633, 74 refs.

Four scenarios of present day antarctic ice sheet mass change are developed from comprehensive reviews of the available glaciological and oceanographic evidence. The gridded scenarios predict widely varying contributions to secular sea level change ranging from -1.1 to 0.45 mm/yr, and predict polar motion and time-varying low-degree gravitational coefficients  $J_1$  that differ significantly from earlier estimates. A reasonably linear relationship between the rate of sea level change from Antarctica and the predicted antarctic  $J_1$  is found for the four scenarios. This linearity permits a series of forward models to be constructed that incorporate the effects of ice mass changes in Antarctica, Greenland, and distributed smaller glaciers, as well as postglacial rebound (assuming the ICE-3G deglaciation history), with the goal of obtaining optimum reconciliation between observed constraints on  $J_1$  and sea level rise. (Auth. mod.)

#### I-56948

Allen, D.R., Stanford, J.L., Elson, L.S., Fishbein, E.F., Froidevaux, L., Waters, J.W., **4-day wave as observed from the Upper Atmosphere Research Satellite microwave sounder**, *Journal of the atmospheric sciences*, Feb. 1, 1997, 54(3), p.420-434, 40 refs.

The "4-day wave" is an eastward moving quasi-nondispersive feature with period near 4 days occurring near the winter polar stratopause. This paper presents evidence of the 4-day feature in Microwave Limb Sounder (MLS) temperature, geopotential height, and ozone data from the late southern winters of 1992 and 1993. Space-time spectral analyses reveal a double-peaked temperature structure consisting of one peak near the stratopause and another in the lower mesosphere, with an out-of-phase relationship between the two peaks. This double-peaked structure is reminiscent of recent three-dimensional barotropic/baroclinic instability model predictions and is observed here for the first time. The height variation of the 4-day ozone signal is shown to compare well with a linear advective-photochemical tracer model. Negative regions of quasigeostrophic potential vorticity (PV) gradient and positive Eliassen-Palm flux divergence are shown to occur, consistent with instability dynamics playing a role in wave forcing. Spectral analyses of PV derived from MLS geopotential height fields reveal a 4-day signal peaking near the polar stratopause. The three-dimensional structure of the 4-day wave resembles the potential vorticity "charge" concept, wherein a PV anomaly in the atmosphere (analogous to an electrical charge in a dielectric material) induces a geopotential field, a vertically oriented temperature dipole, and circulation about the vertical axis. (Auth.)

#### I-56950

Lu, L.H., Zhou, X.J., Bian, L.G., Zhang, Z.Q., Zheng, X.D., **Medium range oscillation characteristics of ozone at Zhongshan and Syowa stations during the antarctic ozone-hole period**, *Antarctic Research (Chinese edition)*, Sep. 1996, 8(3), p.20-28, In Chinese with English summary. 8 refs.

Data on atmospheric ozone, surface temperature and pressure, collected at Zhongshan and Showa stations in July-Dec. 1993 and 1994, are presented. Quasi-one and -two week oscillations were observed; the latter was stronger than the former, for each atmospheric element, in 1993, but in 1994 only the quasi-one week oscillation occurred. In the Zhongshan-Showa region, the oscillations propagate from west to east at a speed, for the quasi-one week type, of about 17 longitudinal degree/day. In the Prydz

Bay region, at middle-low stratosphere, the phase difference between the 2 types of oscillations for ozone, isobaric height and temperature is very small. (Auth. mod.)

#### I-56951

Bian, L.G., Lu, L.H., Jia, P.Q., **Characteristics of ultraviolet radiation in 1993-1994 at the Larsemann Hills, Antarctica**, *Antarctic Research (Chinese edition)*, Sep. 1996, 8(3), p.29-35, In Chinese with English summary. 8 refs.

Characteristics of ultraviolet radiation (UV) and global radiation (Q), from Feb. 1993 to Dec. 1994, at the Larsemann Hills, are analyzed. Result show that most of UV and Q received at the horizontal surface occurred mainly in the warm season (Oct.-Feb.); the values were 87 and 86% of the annual total amounts, respectively. The strongest radiation flux appeared in polar days, when UV values were of the annual amount. The same ratios for the Naqu of the Qinghai, Qingzang Plateau and the Bergen of the arctic circle edge in midsummer were 52 and 47%. The ratio between UV and Q in springtime at the Larsemann Hills was greater than that in other seasons; this phenomenon did not occur at the arctic circle edge. The decrease of ozone in springtime at the Larsemann Hills not only enhances the UVB, but also has an effect on the UV and Q; their relations were basically met by the relationship of logarithmic line. (Auth. mod.)

#### I-56962

Qu, S.H., Gao, D.Y., **Characteristics of atmospheric boundary layer structure and transfer of the turbulent fluxes over the Zhongshan Station area, Antarctica**, *Antarctic Research (Chinese edition)*, Dec. 1996, 8(4), p.1-10, In Chinese with English summary. 14 refs.

Characteristics of the atmospheric boundary layer structure, and the transfer of turbulent fluxes over the Zhongshan Station area, are discussed. Data on temperature, humidity, wind and pressure were collected by using the TMT (tethersonde meteorological tower) sounding system in the summer of 1994-1995. The fluxes of momentum and sensible heat were evaluated, by semiempirical flux-profile relation of Monin-Obukhov similarity theory, from the observed data. Results show that the characteristics of atmospheric boundary layer structure and the transfer of turbulent fluxes have obvious differences at different stations. (Auth. mod.)

#### I-56974

Webb, R.S., Rind, D.H., Lehman, S.J., Healy, R.J., Sigman, D., **Influence of ocean heat transport on the climate of the Last Glacial Maximum**, *Nature*, Feb. 20, 1997, 385(6618), p.695-699, 45 refs.

A series of climate simulations using an atmospheric general circulation model shows that maintaining ocean heat transport at close to present-day values, but with otherwise glacial boundary conditions, leads to an enhanced cooling, particularly in the tropics. This is in agreement with recent geochemical evidence from fossil corals, ground waters, and ice. Near-modern ocean heat transport may have been sustained in all ocean basins during the Last Glacial Maximum in order to balance the formation and export of Glacial North Atlantic Intermediate Water. Graphs which show the pole to pole ocean heat transport are included and discussed in the text. (Auth. mod.)

#### I-56975

Bard, E., Rostek, F., Sonzogni, C., **Interhemispheric synchrony of the last deglaciation inferred from alkenone palaeothermometry**, *Nature*, Feb. 20, 1997, 385(6618), p.707-710, 39 refs.

In this paper the alkenone method of sea surface temperature reconstruction is applied to several high-resolution sediment cores recovered from the tropical Indian Ocean between 20°N and 20°S. The inferred initial sea surface temperature warming ca. 15,000 years ago at 20°S is in phase with Northern Hemisphere sea (this study) and air temperature changes, but lags antarctic warming by several millennia. This finding, along with the results of recent modelling studies, provides strong support for the idea that changes in the ocean's global thermohaline circulation were not the only cause of interhemispheric climate teleconnection during the last deglaciation. (Auth. mod.)



**I-56980**

Yang, S.K., Zhou, S.S., McMillin, L.M., Campana, K.A., **Characteristics of the NOAA/NESDIS cloud retrieval algorithm using HIRS-MSU radiance measurements**, *Journal of applied meteorology*, Nov. 1996, 35(11), p.1980-1990, 12 refs.

This cloud retrieval algorithm described in McMillin et al., uses multiple channel pairs with a two-pass procedure for enhancing accuracies. The current paper complements McMillin et al. in several ways. First, it describes the characteristics of the channel pairs used in the algorithm while documenting the logic of the channel selection. It shows that the cloud-top heights and cloud fractions are dependent on the sensing channel pairs. The higher the altitude of the weighting function, the smaller the cloud fractions. Second, it adds an atmospheric attenuation correction and displays its effect on cloud-top heights. Without the attenuation correction, the cloud-top distributions are separated into two bands, possibly as a result of the distance between the heights of the weighting functions of the sensing channel pair. The attenuation correction effectively eliminates the gap, both by lowering the upper band and by elevating the lower band. The cloud fractions from this experimental operation are compared with Air Force Real-Time Nephelometer for 3 months, and they reveal its strength in detecting low-level stratus. The range of data retrieval extends from approximately 80°S through 80°N. (Auth. mod.)

**I-56981**

Pinglot, J.F., Pourchet, M., **Radioactivity measurements applied to glaciers and lake sediments**, *Science of the total environment*, Dec. 1, 1995, Vols. 173/174, Special issue: Environmental Radiochemical Analysis. A collection of Papers Presented at the Seventh Symposium on Environmental Radiochemical Analysis. Edited by G.W.A. Newton, p.211-223, 45 refs.

The behavior of glaciers, polar ice-caps and lakes can be studied by means of natural and artificial radioactivity measurements conducted on snow (Alps, Arctic and Antarctic) and sediments samples. The nuclear decay of elements ( $^{210}\text{Pb}$  and  $^{238}\text{U}$  fission products) and nuclear events (atmospheric thermonuclear tests: 1954 and 1962-63; Chernobyl accident: 1986) allow an absolute dating of corresponding layers. These determinations need radiochemical separations (electro-plating, ion exchange filters), followed by ultra low level alpha and gamma spectrometries, or beta counting ( $^{137}\text{Cs}$ ,  $^{90}\text{Sr}$ ). The high purity—N type—germanium detector (Compton-suppressed) allows the  $^{210}\text{Pb}$  analysis at 46.52 keV, enabling a direct comparison with  $^{210}\text{Po}$  alpha spectrometry. Typical applications concern primarily dating, and the determination of mean annual accumulation rates of glaciers, sedimentation rate and mixing time in lakes, with their associated spatio-temporal variations. These measurements give access to the global fallouts of radionuclides and to meteorological parameters: air to snow (or sediment) transfer, deposition processes and atmospheric circulation. (Auth.)

**I-56983**

Chen, T.C., Tribbia, J.J., Yen, M.C., **Interannual variation of global atmospheric angular momentum**, *Journal of the atmospheric sciences*, Oct. 1, 1996, 53(19), p.2852-2857, 11 refs.

The relative atmospheric angular momentum (RAM) integrated over the globe is an explicit variable representing the state of the atmospheric general circulation. After removing the annual, semiannual, and higher-frequency components, the filtered global RAM time series is highly correlated with both the Southern Oscillation index and the tropical Pacific sea surface temperature averaged over Area Nino-3. The interannual variation of global RAM is coherent with the poleward propagation of RAM anomalies. The global RAM anomalies reach their minimum values when westerly anomalies emerge in the Tropics and higher latitudes during a cold El Niño-Southern Oscillation (ENSO) event. On the other hand, global RAM anomalies attain their maximum values when westerly anomalies arrive at the subtropics of both hemispheres during a warm ENSO event. It is demonstrated that the poleward propagation of RAM anomalies results from the flip-flop oscillation of the anomalous circulation between cold and warm ENSO events. Included are graphs of atmospheric angular momentum from 1979 through 1992 extending globally from 90°S to 90°N. (Auth. mod.)

**I-56984**

Callis, L.B., Natarajan, M., Lambeth, J.D., Boughner, R.E., **On**

**the origin of midlatitude ozone changes: Data analysis and simulations for 1979-1993**, *Journal of geophysical research*, Jan. 20, 1997, 102(D1), p.1215-1228, Refs. p.1227-1228.

Satellite data show large declines in global (4.5%) and mid-latitude (10%) ozone in the mid-1980s and during 1992 and 1993. Analyses of ozone, temperature, and aerosol records and two-dimensional chemical transport simulations have been carried out to develop an understanding of the causes of these changes. Simulations include contemporary homogeneous and heterogeneous chemistry. Also included are the effects of trace gas increases, dilution and denitrification associated with the antarctic ozone destruction, solar cycle effects including relativistic electron precipitation (REP), variable diabatic transport fields and temperature, and variable sulfate aerosol surface area density and acidity. Simulated global and mid-latitude ozone agree very well with observations for the entire period. (Auth. mod.)

**I-56985**

Wauben, W.M.F., Bintanja, R., Van Velthoven, P.F.J., Kelder, H., **On the magnitude of transport out of the Antarctic polar vortex**, *Journal of geophysical research*, Jan. 20, 1997, 102(D1), p.1229-1238, Refs. p.1237-1238.

The degree of isolation of the antarctic stratospheric vortex in late winter and spring is investigated quantitatively by using a three-dimensional global tracer transport model, in which the transport is computed from European Centre for Medium-Range Weather Forecasts analyzed data. The evolution of the spatial distribution of passive tracers provides information about variations in the vortex structure, as well as about the magnitude of the transport out of the antarctic vortex. The vortex structure revealed by tracers released inside the vortex at 72.5 hPa corresponds well with the satellite-derived distribution of total ozone. The model computations indicate that in late winter and spring of the years 1990-1993, there is a quasi-horizontal cross-vortex transport of about 0.24% per day of the total tracer amount, while per day, 0.83% of the vortex mass descends into the troposphere. This indicates that roughly 65% of the vortex air is flushed out during Aug.-Sep.-Oct. (Auth. mod.)

**I-56986**

Chubachi, S., **Annual variation of total ozone at Syowa Station, Antarctica**, *Journal of geophysical research*, Jan. 20, 1997, 102(D1), p.1349-1354, 21 refs.

Analysis of total ozone data from Showa Station for the years 1982 to 1994 reveals several new features in the behavior of ozone depletion. There is no significant year-to-year trend or seasonal variation of total ozone during the polar night (June and July), and the mean value for these months provides a baseline for determining the springtime ozone decrease. Also, the constancy of the polar night data shows that the ozone depletion in spring does not affect the following wintertime total ozone. September total ozone relative to the mean total ozone during June and July varies linearly with that for Aug., showing that the ozone destruction process is active in Aug. and Sep.; this relationship does not appear to continue through Oct. when corruption or displacement of the polar vortex occurs. The magnitude of springtime ozone depletion has increased from the 1980s to the 1990s. Moreover, analysis of temperature at the 100-hPa level shows that final warming at Showa has been delayed 1.2 days per year. This suggests that the polar vortex is stabilized by the development of the antarctic ozone hole. (Auth.)

**I-56987**

De Zafra, R.L., Chan, V., Crewell, S., Trimble, C., Reeves, J.M., **Millimeter wave spectroscopic measurements over the South Pole. 3. The behavior of stratospheric nitric acid through polar fall, winter, and spring**, *Journal of geophysical research*, Jan. 20, 1997, 102(D1), p.1399-1410, Refs. p.1409-1410.

The authors present data from a 9-month series of ground-based measurements of stratospheric nitric acid, made over the South Pole from mid-Apr. 1993 to mid-Jan. 1994. Observations were typically made at 3- to 6-day intervals. These measurements provide the first quasi-continuous series of vertical mixing ratio profiles for this species in the heart of the south polar vortex. Conversion of  $\text{NO}_x$  to nitric acid by heterogeneous reactions, and its incorporation into polar stratospheric cloud (PSC) particles, along with subsequent gravitational settling, is considered to be the main denitrifying mechanism in the antarctic stratosphere, setting up con-



ditions for ozone destruction at the end of winter. A small increase in  $\text{HNO}_3$  was seen between Apr. and the end of May, after which a rapid loss took place below 25 km. By the end of observations in Jan. 1994, mixing ratios and column densities above ca. 15 km had not yet reached more than about half the values seen the previous Apr., indicating that a rather large increase in stratospheric  $\text{HNO}_3$  occurs in the early austral fall over the south polar region. (Auth. mod.)

#### I-56988

Shindell, D.T., De Zafra, R.L., **Limits on heterogeneous processing in the Antarctic spring vortex from a comparison of measured and modeled chlorine**, *Journal of geophysical research*, Jan. 20, 1997, 102(D1), p.1441-1449, Refs. p.1448-1449.

Forty-day photochemical model runs are compared with ground-based stratospheric ClO observations taken during the austral spring of 1993. The purpose is to explore the range of required heterogeneous processing within which one can reproduce the duration and degree of chlorine activation within the antarctic spring vortex. The record ozone losses observed during Sep. of 1993 may be attributed to catalytic loss due to chlorine maintained in active forms by heterogeneous processing despite the sparse particle loading of the antarctic lower stratosphere at that time. The ozone loss rates predicted by the model during the formation of the springtime antarctic ozone hole indeed agree quite well with observations. The one-dimensional model is also able to reproduce both the observed timing and rate for subsequent deactivation of chlorine. Renitrication from PSC evaporation is not required for this deactivation, as HCl reformation is very rapid at low ozone values. (Auth. mod.)

#### I-56989

Atkinson, R.J., Plumb, R.A., **Three-dimensional ozone transport during the ozone hole breakup in December 1987**, *Journal of geophysical research*, Jan. 20, 1997, 102(D1), p.1451-1466, 16 refs.

The results of a detailed study of the Dec. 1987 ozone hole breakup is reported. A quasi-conservative coordinate transformation technique is used on ozone data from the second stratospheric aerosol and gas experiment (SAGE II) to obtain a three-dimensional description of the hemispheric ozone distribution immediately prior to the event. A contour advection technique is used to describe the stratospheric material evolution during the period, and this provides a detailed depiction of the quasi-horizontal ozone transports which occurred at the time. The calculated dynamically induced total ozone changes during the period are then separated into contributions arising from "vertical" and "horizontal" advection. The potential vorticity tendency form of the quasi-geostrophic omega equation is solved to provide insight into the horizontal scales and vertical domain of the dynamical "forcing" primarily responsible for the vertical advection component. Finally, by imposing a "no ozone hole" ozone distribution during the period, and comparing the resulting ozone distribution with that obtained with the unmodified reconstruction, the authors then isolate a significant component of the observed mid-latitude total ozone changes which was attributable solely to the presence of antarctic ozone depletion. (Auth. mod.)

#### I-56990

Lambert, A., et al, **Global evolution of the Mt. Pinatubo volcanic aerosols observed by the infrared limb-sounding instruments CLAES and ISAMS on the Upper Atmosphere Research Satellite**, *Journal of geophysical research*, Jan. 20, 1997, 102(D1), p.1495-1512, Refs. p.1509-1512.

The cryogenic limb array etalon spectrometer (CLAES) and the improved stratospheric and mesospheric sounder (ISAMS) instruments on board the Upper Atmosphere Research Satellite (UARS) have been used to produce global information on the Mt. Pinatubo volcanic aerosol for the period from Oct. 1991 to Apr. 1993. The satellite infrared extinction measurements near 12  $\mu\text{m}$  are converted into the aerosol-related parameters necessary for modelling the effects of the volcanic aerosol on the aeronomy of the stratosphere and are presented as zonal mean distributions for 80°S to 80°N averaged over 35-day periods. The aerosol composition is derived from the CLAES and ISAMS temperature measurements and the water vapor abundances are obtained from the microwave limb sounder (MLS). The aerosol volume density is obtained from the extinction mea-

surements from which the surface area density and the effective particle radius are estimated. Rate constants are derived for the heterogeneous reactions of  $\text{N}_2\text{O}_5$  and  $\text{ClONO}_2$  on the sulphate aerosols. The application of the aerosol parameters to the investigation of tracer transport, heterogeneous chemistry, and radiative transfer is discussed. (Auth. mod.)

#### I-56991

Taalas, P., Damski, J., Kyrö, E., Ginzburg, M., Talamoni, G., **Effect of stratospheric ozone variations on UV radiation and on tropospheric ozone at high latitudes**, *Journal of geophysical research*, Jan. 20, 1997, 102(D1), p.1533-1539, 21 refs.

A negative trend of stratospheric ozone has been observed, especially at high latitudes, during the last 15 years; a negative trend in total ozone was detected during 1987-1994; -10% at Marambio Station (64°S) and -12% at Sodankylä (67°N). The strongest negative trend was detected during spring. Because stratospheric ozone is controlling the flux of solar UV-B radiation reaching the troposphere, loss of stratospheric ozone may have a strong impact on the destruction and production reactions of tropospheric ozone. The authors have studied the ozone sounding records of 1988-1994 at Marambio Station and at Sodankylä, Finland, to find observational evidence of tropospheric ozone changes due to stratospheric ozone variations. It was found that springtime stratospheric ozone loss has a pronounced impact on the upper tropospheric ozone in both hemispheres. Average ozone deviation of -12.8%, from the 1988 to 1994 means in the 6- to 8-km layer, has been observed in Antarctica during the months with stratospheric ozone loss, and -10.0% in the Arctic, respectively. Daily total ozone records and radiative transfer calculations were used to study the UV-B doses reaching the troposphere. (Auth. mod.)

#### I-56992

Harris, N.R.P., et al, **Trends in stratospheric and free tropospheric ozone**, *Journal of geophysical research*, Jan. 20, 1997, 102(D1), p.1571-1590, Refs. p.1588-1590.

Trends in total ozone have been calculated for the ground-based network and the combined data set from the solar backscatter ultraviolet (SBUV) instruments on Nimbus 7 and NOAA 11. Recent ozone measurements are described for both Antarctica and the rest of the globe. The sulphate aerosol resulting from the eruption of Mount Pinatubo in 1991 and dynamic phenomena seem to have affected ozone levels, particularly at northern mid-latitudes and in the antarctic vortex. However, the record low values observed were partly caused by the long-term trends and the effect on the calculated trends was less than 1.5%/decade. (Auth. mod.)

#### I-56994

Gallée, H., **Possible influence of mesocyclonic activity on snow precipitation in the antarctic coastal zone**, *Zeitschrift für Gletscherkunde und Glazialgeologie*, 1995, Vol.31, International Commission on Snow and Ice. Symposium on Measurement and Reconstruction of Glacier Mass Balance, Pt.1. Edited by M. Kuhn, p.17-24, With German summary. 13 refs.

The mesocyclonic activity in the southwestern Ross Sea is examined, with emphasis on its forcing by katabatic winds. The three-dimensional version of primitive equation model is used, in which a representation of cloud microphysical processes has been introduced. Idealized boundary conditions are prescribed. In particular, the ocean is assumed to be completely ice-free. This case corresponds to a fall situation which coincides with the climatological maximum of estimated precipitation at McMurdo Station on Ross I. Due to the propagation of katabatic winds over the ocean, boundary-layer fronts form. Clouds and snow precipitation are generated in the fronts, in particular over McMurdo Sound. (Auth. mod.)

#### I-57002

Kuroda, Y., Yamazaki, K., **Poleward jet-shift in the Southern Hemisphere winter simulated with a general circulation model**, *Papers in meteorology and geophysics*, Sep. 1996, 47(1), p.47-56, 14 refs.

An investigation was conducted of the poleward jet-shift appearing in the Southern Hemisphere winter, by means of data simulated by a general circulation model. The poleward jet-shift in the model is found to be well simulated, although the jet in mid-winter exists fairly southward compared with observation. It is conjectured that the poleward jet-shift in the model was preconditioned by the wave breaking of a forerunning Rossby wave



with zonal-wavenumber 1, and then it occurred by the breaking of another strong Rossby wave packet with zonal-wavenumber 1 at the jet axis in the upper stratosphere. (Auth.)

### I-57005

Reason, C.J.C., **Stability dependent parameterisations of vertical mixing in ocean general circulation models**, *Meteorology and atmospheric physics*, 1996, 61(1-2), p.1-18, 40 refs.

Parameterizations of mixing are investigated in simulations of ocean climate using a global ocean general circulation model (OGCM). Focus is placed on the sensitivity of the large scale circulation, water mass formation, and transport of heat as measures of the model's ability to represent current climate. The model resolution is typical of OGCMs being coupled to atmospheric. Under the assumption of constant vertical eddy coefficients, (the control case), the model climatology displays acceptable values of North Atlantic Deep Water formation, Antarctic Circumpolar Current (ACC) transport, and Indonesian through-flow but an excessively deep and diffuse pycnocline structure with weak stratification in the deep ocean. (Auth. mod.)

### I-57042

Argentini, S., Mastrantonio, G., Viola, A., Pettre, P., Dargaud, G., **Sodar performance and preliminary results after one year of measurements at Adélie Land Coast, East Antarctica**, *Boundary-layer meteorology*, Oct. 1996, 81(1), p.75-103, 25 refs.

Dumont d'Urville, on the antarctic coast, is an area well known for the presence of strong katabatic winds blowing from the antarctic plateau toward the sea almost all year. Since Jan. 1993, a three-axis Doppler sodar has been operating in this area to investigate the variability of the boundary layer structure and dynamics. In this paper, the capabilities, behavior and advantages of using this ground-based remote-sensing system in Antarctica are evaluated after one year of measurements. This instrument may play an important role in boundary layer studies in remote regions where other profiling techniques (e.g., kitoons, slow ascent balloons) are difficult and expensive. The statistical analysis of the wind speed shows that the wind blows from the 30° angular sectors centered at 90°, 150°, 180°, and 0°. The winds from 90° and 150° constitute the main local circulation and have, most of the time, the characteristics of a katabatic flow, whereas the winds blowing from 180°, arising from the surface temperature difference between the sea and the land, are land breezes. Strong winds coming from the ocean (0°), attributable to the inland penetration of depressions, have been observed in May, Oct., and Nov. (Auth. mod.)

### I-57056

Wyputta, U., **On the transport of trace elements into Antarctica using measurements at the Georg-von-Neumayer Station**, *Tellus*, Feb. 1997, 49B(1), p.93-111, 31 refs.

Origin and transport of  $^{222}\text{Rn}$ , surface ozone, and sea salt measured at the German antarctic research station Georg von Neumayer (GvN) were investigated together with local meteorological observations and calculated 2-dimensional trajectories. Nearly 92% of all trajectories calculated at the 850 hPa level and 97% on the 925 hPa surface indicate easterly flows due to orographic effects of the antarctic continent. In addition, time series of trace elements measured at GvN were analyzed together with local meteorological data and the trajectories to find the source regions of the trace elements. Primary results are that periods with high radon-222 concentrations are mostly connected to cyclones approaching from the South American continent. Most of the maxima of surface ozone and sea salt are also well correlated with cyclonic activities near the antarctic continent. (Auth. mod.)

### I-57057

Pearce, F., **Full Moon warns of icy wastes**, *New scientist*, Jan. 11, 1997, 153(2064), p.15.

Satellite data have revealed that temperatures in the polar regions of both northern and southern hemispheres fluctuate markedly with the waxing and waning of the Moon. According to members of the Department of Geography and Office of Climatology at Arizona State University in Tempe, average temperatures in the Arctic and Antarctic are more than 0.55°C higher around the full Moon than at the new Moon. The cause

appears to be a strong transfer of heat in the atmosphere towards the poles, possibly caused by the greater tidal pull of a full Moon changing wind patterns. (Auth. mod.)

### I-57076

Legrand, M., **Ice-core records of atmospheric sulphur**, *Royal Society of London. Philosophical transactions. Series B*, Feb. 28, 1997, 352(1350), p.241-250, 38 refs.

Sulphate and methanesulphonate (MSA), the two major sulphur species trapped in polar ice, have been extensively studied in antarctic and Greenland ice cores spanning the last centuries as well as the entire last climatic cycle. Data from the cores are used to investigate the past contribution of volcanic and biogenic emissions to the natural sulphur budget in high latitude regions of both hemispheres. Sulphate concentrations in polar ice very often increased during one or two years after large volcanic eruptions. Sulphate records show that fossil fuel combustion has enhanced sulphate concentrations in Greenland snow by a factor of four since the beginning of this century, and that no similar trend has occurred in Antarctica. At present, sulphate in antarctic snow is mainly marine and biogenic in origin and the rate of dimethyl sulphide (DMS) emissions may have been enhanced during past developments of El Niño Southern Oscillations (ENSO). Long-term variations in Greenland cores are opposite in sign to those revealed by antarctic ice cores. Such a difference suggests that climate changes led to a quite different sulphur cycle response in the two hemispheres. (Auth. mod.)

### I-57113

Khomutov, E. V., **Meteorology of the southwestern Atlantic region** [Meteorologicheskaya kharakteristika raiona IUgo-Zapadnoi Atlantiki], Elektronika Karlsberga v IUzhnoi Poliarnoi Frontal'noi zone, Tom 1. Usloviia obitaniia i raspredeleniia. Metodika poiska i issledovaniia. Problemy obrabotki syr'ia (*Elektrona carlsbergi* in the South Polar Frontal zone, Vol. 1. Habitat and distribution. Scouting and research techniques. Problems of raw fish processing). Edited by V. V. Maslennikov, Moscow, Vsesoiuznyi nauchno-issledovatel'skii institut morskogo rybnogo khoziaistva i okeanografii (VNIRO), 1990, p.23-38, In Russian with English summary. 2 refs.

### DLC SH351.E44E43 1990 Vol.1

To describe air masses over the southwestern Atlantic Ocean, a classification method is used which takes into account the distribution of land, ocean, ice, and water temperature. According to this classification, 3 types of air masses are identified: tropical, polar and antarctic. The calculation over the South Atlantic Ocean is determined by the interaction of several quasi-stationary baric formations, the main of which are continental antarctic and subtropical anticyclones and the zone of active cyclogenesis. The cyclonic activity in the area falls into 4 main types, the predominance of which is associated with the occurrence and the position of the second center of the Atlantic subtropical anticyclone, and its interaction with subtropical Pacific and antarctic continental anticyclones. (Auth. mod.)

### I-57120

Hall, N.M.J., Valdes, P.J., **GCM simulation of the climate 6000 years ago**, *Journal of climate*, Jan. 1997, 10(1), p.3-17, 35 refs.

Two 10-yr integrations of the U.K. Universities Global Atmospheric Modelling Programme General Circulation Model are presented. Each has a full seasonal cycle, T42 resolution, interactive land and sea ice for both polar regions, and prescribed sea surface temperatures. They differ in that one integration represents present day climate and the other has a perturbed orbit and reduced atmospheric concentrations of CO<sub>2</sub> appropriate to the climate of 6000 years ago. The 6k integration produces enhanced continental warmth during summer and cold during winter. Changes in atmospheric temperature gradients brought about by the surface response lead to altered jet stream structures and transient eddy activity, which in turn affect precipitation patterns. (Auth. mod.)

### I-57123

Austin, J., **Stratospheric ozone studies at the UKMO: recent history and five year research strategy**, *Physics and chemistry of the earth*, Feb. 1995, 20(1), p.39-52, 30 refs.



The recent achievements of the U.K. Meteorological Office stratospheric ozone research program will first be briefly described. The development of trajectory methods, to establish rigorous comparisons between chemical observations and model results, have led to the investigation of coupling processes such as the influence of planetary waves on the antarctic ozone hole and the possibility through CO<sub>2</sub> increase of an arctic ozone hole. Such process studies have been continued with a recent investigation of the effect of the quasi-biennial oscillation and chlorine loading on the interannual variability of the antarctic ozone hole. Over the next 5 years such stratospheric research will concentrate on theory and modelling, and will continue to be coordinated between chemistry and dynamics. The emphasis will be on quantitative modelling and diagnostic studies. (Auth. mod.)

#### I-57124

Vial, F., et al, **STRATÉOLE: a project to study antarctic polar vortex dynamics and its impact on ozone chemistry**, *Physics and chemistry of the earth*, Feb. 1995, 20(1), p.83-96, 25 refs.

The STRATÉOLE experiment is designed to study the wintertime antarctic lower stratosphere polar vortex and its springtime breakdown. To this end, it is planned to fly a large number of long-lived (3 months), small isopycnic drifting balloons instrumented with temperature and pressure sensors, GPS and transmitters. The main goal of STRATÉOLE experiment is to provide an unprecedented documentation of the wind field in the vicinity of the vortex edge in order to study vortex porosity and erosion, filamentation and mixing properties of the air masses. (Auth. mod.)

#### I-57125

Huber, B.T., Hodell, D.A., Hamilton, C.P., **Middle-Late Cretaceous climate of the southern high latitudes: stable isotopic evidence for minimal equator-to-pole thermal gradients**, *Geological Society of America. Bulletin*, Oct. 1995, 107(10), p.1164-1191, For a discussion and reply pertaining to this work, see I-57126. Refs. p.1189-1191.

#### DLC QE1. G2

A detailed  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$  stratigraphy has been generated from analysis of well-preserved Albian-early Maastrichtian foraminifera from Deep Sea Drilling Project (DSDP) Sites 511 and 327 (Falkland Plateau); and Cenomanian and Coniacian-Santonian foraminifera from DSDP Site 258 (Naturaliste Plateau) in the southern Indian Ocean. These results, when combined with previously published Maastrichtian stable isotope data from Ocean Drilling Program (ODP) Site 690 (Weddell Sea), provide new insight into the climatic and oceanographic history of the southern high latitudes during middle-Late Cretaceous time. Foraminiferal oxygen isotopic data from published sources and this study are averaged for each site, corrected for latitudinal changes in salinity based on modern-day surface-water values, and plotted versus paleolatitude for the late Albian, Coniacian-Santonian, and late Maastrichtian. Differences between low- and high-latitude surface-water paleotemperatures are estimated at  $\approx 14^\circ\text{C}$  during the late Albian and late Maastrichtian, but the Coniacian-Santonian reconstruction reveals only a  $0-4^\circ\text{C}$  latitudinal temperature gradient. Uncertainty regarding Cretaceous salinity gradients and possible diagenetic alteration of  $\delta^{18}\text{O}$  values introduce error into the estimates of paleolatitudinal thermal gradients; however, apparent low equator-to-pole temperature differences could indicate much higher poleward heat transport than at present. (Auth. mod.)

#### I-57126

Price, G.D., Sellwood, B.W., Pirrie, D., Huber, B.T., Hodell, D.A., **Middle-Late Cretaceous climate of the southern high latitudes: stable isotopic evidence for minimal equator-to-pole thermal gradients: Discussion and reply**, *Geological Society of America. Bulletin*, Sep. 1996, 108(9), p.1192-1196, For the paper under discussion, see I-57125. Refs. p.1193 and p.1196.

Two groups of researchers offer disparate views on how climatic progressions developed in the regions during the time period identified in the title. The groups used different data sets (belemnites vs foraminifera), reached different conclusions, and both are reluctant to recant. The authors of the paper under discussion conclude that debate on this topic is likely to continue until several other critical areas of research have produced conclusive evidence supporting a viewpoint.

#### I-57132

Brathauer, U., **Radiolarians as indicators for Quaternary climatic changes in the southern ocean (Atlantic sector)** [Rekonstruktion quartärer Klimaänderungen im atlantischen Sektor des Südpolarmeeres anhand von Radiolarien], *Berichte zur Polarforschung*, 1996, No.216, 163p., In German with English summary. Refs. p.85-93.

Quaternary radiolarian assemblages were examined in selected sediment cores recovered in the eastern sector of the southern ocean in order to reconstruct the paleoenvironment, especially the summer sea surface paleotemperatures. Additionally, cross-spectral analyses on paleoclimatic proxies were used to determine the relationships between regional and global climatic signals. The sea surface paleotemperatures were estimated using the transfer function technique (IKM). Twenty-nine selected radiolarian species or species groups preserved in 35 surface sediment samples were grouped into four factors (assemblages) and related to modern sea surface temperatures. A paleotemperature equation was developed and used to estimate Quaternary sea surface temperatures for the Subantarctic and Polar Front Zones of the Antarctic Circumpolar Current. Paleotemperatures in the time period between 720 and 360 ka generally display values which are 6 to  $10^\circ\text{C}$  lower than modern temperatures. Cross-spectral analyses based on the Blackmann-Tuckey method were performed on paleoclimatic proxies to calculate the phase between these parameters and the global ice volume. Changes in carbonate content of sediment, sea surface temperature, benthic foraminiferal assemblages and paleoproductivity preceded changes in global ice volume in all Milankovitch frequencies in the Atlantic sector of the southern ocean. (Auth. mod.)

#### I-57163

Hanna, E., **Role of antarctic sea ice in global climate change**, *Progress in physical geography*, Dec. 1996, 20(4), p.371-401, Refs. p.397-401.

Taking a distinct interdisciplinary focus, a critical view is presented of the current state of research concerning antarctic sea-ice/atmosphere/ocean interaction and its effect on climate on the interannual timescale, with particular regard to anthropogenic global warming. Sea-ice formation, morphology, thickness, extent, seasonality and distribution are introduced as vital factors in climatic feedbacks. Sea-ice/atmosphere interaction is next discussed, emphasizing its meteorological and topographical influences and the effects of and on polar cyclonic activity. This leads on to the central theme of sea ice in global climate change, which contains critiques of sea-ice climatic feedbacks, current findings on the representation of these feedbacks in global climatic models, and to what extent they are corroborated by observational evidence. Sea-ice/ocean interaction is particularly important. Models developed in the Arctic, where the observational network allows more reasonable validation, can be applied to the Antarctic in suitably modified form so as to account for unique features of the antarctic cryosphere. Benefits in climatic modelling will be gained by treating antarctic sea ice as a fully coupled component of global climate. (Auth. mod.)

#### I-57172

Cheng, D.J., Crewell, S., Klein, U., De Zafra, R.L., Chamberlin, R.A., **Millimeter wave spectroscopic measurements over the South Pole 4. O<sub>3</sub> and N<sub>2</sub>O during 1995 and their correlations for two quasi-annual cycles**, *Journal of geophysical research*, Mar. 20, 1997, 102(D5), p.6109-6116, 15 refs.

Presented are new O<sub>3</sub> and N<sub>2</sub>O observations at the South Pole in 1995 and correlations between O<sub>3</sub> and N<sub>2</sub>O for two 11-month observations during Feb. 1993 and Jan. 1994 and Jan-Dec. 1995. Strong similarities exist between the two quasi-annual cycles for both O<sub>3</sub> and N<sub>2</sub>O. During springtime warmings the O<sub>3</sub>/N<sub>2</sub>O ratio shows a tight coupling between O<sub>3</sub> and N<sub>2</sub>O around 20 km, as transport creates the low-altitude O<sub>3</sub> peak. A rapid and systematic decrease of the O<sub>3</sub>/N<sub>2</sub>O ratio during summer in the 25 to 30 km region supports the increasingly dominant role of photochemistry in producing the vertical profile for O<sub>3</sub> above ca. 25 km. The present analysis should help to clarify the influence of the relatively unique O<sub>3</sub> vertical distribution of polar ozone when interpreting O<sub>3</sub>-N<sub>2</sub>O correlations. (Auth. mod.)

#### I-57173

Strahan, S.E., Nielsen, J.E., Cerniglia, M.C., **Long-lived tracer**



**transport in the antarctic stratosphere**, *Journal of geophysical research*, Nov. 27, 1996, 101(D21), p.26,615-26,629, 18 refs.

Recent observations made by the Cryogenic Limb Array Etalon Spectrometer (CLAES) on the Upper Atmosphere Research Satellite (UARS) indicate that during the austral fall, CH<sub>4</sub> zonal mean isopleths in the antarctic vortex appear to descend more rapidly than those of N<sub>2</sub>O. How is this possible in an isolated region such as the vortex when photochemical sinks are insignificant? To understand these observations, the authors have run a simulation of the 1992 austral fall using the Goddard Global Spectral Mechanistic Model (GSMM) and the three-dimensional Chemistry and Transport Model (CTM). Model tracer fields show good agreement with the observations over a 4-month period beginning in mid-Feb. This analysis demonstrates the relationship between wave activity, eddy transport, and tracer mixing ratios inside the vortex throughout the fall. In addition, CLAES observations deep in the vortex (70-80°S) show gradually increasing CH<sub>4</sub> mixing ratios from Mar. to Sep., implying the importance of eddy-driven mixing within the vortex in winter. (Auth. mod.)

#### I-57174

Davison, B., et al, **Dimethyl sulfide, methane sulfonic acid and physicochemical aerosol properties in Atlantic air from the United Kingdom to Halley Bay**, *Journal of geophysical research*, Oct. 20, 1996, 101(D17), p.22,855-22,867, 58 refs.

The concentrations of dimethyl sulfide in air were obtained during a cruise between the United Kingdom and the Antarctic in the period Oct. 1992 to Jan. 1993 using a method of sampling and analysis optimized to avoid interferences from oxidants. In the polar waters and regions south of the Falkland Is., concentrations from 3 to 714 ng (S)/m<sup>3</sup> were observed. Accumulation mode particle concentrations averaged 25/cm<sup>3</sup> in the clean marine and polar air masses south of 58°S while background condensation nuclei (CN) concentrations were of the order of 400-600/cm<sup>3</sup>. It is not clear whether boundary layer nucleation of new CN or entrainment from the free troposphere provided the source of CN. Periods of elevated CN concentrations were regularly observed in the boundary layer over the Weddell Sea and were attributed to "bursts" of new particle formation. However, shortly after these nucleation events the CN concentration rapidly decayed to the background level through coagulation losses, suggesting little impact on the background CN or cloud condensation nuclei (CCN) concentration. (Auth. mod.)

#### I-57175

Eckman, R.S., Grose, W.L., Turner, R.E., Blackshear, W.T., **Polar ozone depletion: a three-dimensional chemical modeling study of its long-term global impact**, *Journal of geophysical research*, Oct. 20, 1996, 101(D17), p.22,977-22,989, 41 refs.

The export of ozone-poor air from the antarctic polar region following the breakup of the Southern Hemisphere polar vortex is examined with a three-dimensional chemistry transport model. Two 5-year simulations were performed utilizing the NASA Langley Research Center three-dimensional chemistry transport model. One simulation included only gas phase and sulfate aerosol chemistry, while the second simulation also included reactions occurring on polar stratospheric clouds (PSCs). The model-calculated seasonal variation of Southern Hemisphere O<sub>3</sub>, HNO<sub>3</sub>, and active chlorine as a result of PSC chemistry is in reasonable accord with satellite observations. The model reveals that ozone is transported equatorward following the breakup of the polar vortex to approximately 20°S latitude by the first southern summer following the activation of PSC chemistry. These model results, in general agreement with earlier model studies using parameterized chemistry, show that a potential exists for a long-term accumulation of ozone loss in the southern polar region and a gradual increase in the global impact of polar ozone depletion. Comparison with satellite and ground-based observations of ozone trends at mid-latitudes suggests that ozone dilution may be a contributing factor. Experiments were performed to examine the sensitivity of the rate of local ozone recovery following the breakup of the vortex to the depth and spatial extent of the denitrification of polar air. (Auth. mod.)

#### I-57176

Portmann, R.W., Solomon, S., Garcia, R.R., Thomason, L.W., Poole, L.R., McCormick, M.P., **Role of aerosol variations in anthropogenic ozone depletion in the polar regions**, *Journal of geophysical research*, Oct. 20, 1996, 101(D17), p.22,991-23,006,

61 refs.

A climatology of aerosol surface area inferred from satellite measurements is used as input in a two-dimensional model to study the long-term evolution of polar ozone depletion, especially the antarctic ozone hole. It is found that volcanic aerosol inputs very likely modulate the severity of the ozone hole. In particular, the rapid deepening of the ozone hole in the early 1980s, as seen, for example, in the Halley Bay total ozone measurements, was probably caused by accelerated heterogeneous chemistry associated with an increase in aerosol surface area due to volcanic injection combined with the anthropogenic perturbation of stratospheric chlorine. This is further substantiated by the large antarctic ozone decline observed and modeled after the eruption of Mount Pinatubo. A number of factors that influence the ozone hole are also investigated, including the effect of liquid versus frozen aerosol, the effects of denitrification and dehydration, the role of HO<sub>x</sub> in HCl and ClONO<sub>2</sub> recovery, and the effect of chlorine partitioning at the start of winter. These findings suggest that future arctic ozone depletion could be severe in unusually cold winters or years with large volcanic aerosol surface area. (Auth. mod.)

#### I-57178

Paparella, F., Babiano, A., Basdevant, C., Provenzale, A., Tanga, P., **Lagrangian study of the antarctic polar vortex**, *Journal of geophysical research*, Mar. 27, 1997, 102(D6), p.6765-6773, 20 refs.

The authors study the dynamics of passively advected tracers in the antarctic polar vortex, using the wind fields provided by the European Centre for Medium-Range Weather Forecasts' (ECMWF) analysis from Aug. to Oct. 1993. Advection on both isopycnal and isentropic surfaces is considered. A new definition of the vortex edge, identified as the maximum of kinetic energy, is compared with the definition based on the maximum gradient of Ertel potential vorticity. Using the kinetic energy criterion, they study the permeability of the polar vortex in the framework of the launch strategy of the Stratospheric Eole (Strateole) polar ozone experiment. A quantitative estimate of the probability that a passive tracer may cross the vortex edge, confirming the strong impermeability of the polar vortex to inward and outward particle motions is included. (Auth. mod.)

#### I-57179

Hansen, J., et al, **Wonderland climate model**, *Journal of geophysical research*, Mar. 27, 1997, 102(D6), p.6823-6830, 13 refs.

The authors obtain a highly efficient global climate model by defining a sector version (including both polar regions) of the coarse resolution Goddard Institute for Space Studies model II. The geography of Wonderland is chosen such that the amount of land as a function of latitude is the same as on Earth. They show that the zonal mean climate of the Wonderland model is very similar to that of the parent model II. (Auth. mod.)

#### I-57180

Engelen, R.J., Stephens, G.L., **Infrared radiative transfer in the 9.6-μm band: application to TIROS operational vertical sounder ozone retrieval**, *Journal of geophysical research*, Mar. 27, 1997, 102(D6), p.6929-6939, 28 refs.

This paper introduces a radiative transfer model for the 9.6-μm ozone band that specifically matches the TIROS operational vertical sounder (TOVS) channel 9. The model is based on a spectral Malkmus band model for transmission. While this new model is exploited in the development of the retrieval described in this paper, the result has wider applicability to ozone climate problems, in both the Arctic and Antarctic, requiring calculation of the radiative forcing associated with changing ozone. Because the TOVS ozone channel is mainly sensitive to lower stratospheric ozone, ozone columns of the upper layer (above 30 hPa and with mean pressure of 10 hPa) are prescribed as a function of latitude. Ozone columns of the lower layer (mean pressure of 105 hPa) are then retrieved. Global distribution of the retrieval error and also of the contribution of a priori knowledge to the retrieval is presented to provide a validity of the ozone retrievals. Total ozone mapping spectrometer (TOMS) statistics are used as a priori information in the retrieval, and the 40-layer model is used to estimate the forward model error of the two-layer model. (Auth. mod.)

#### I-57181

Yamanouchi, T., Charlock, T.P., **Effects of clouds, ice sheet, and**



**sea ice on the Earth radiation budget in the Antarctic**, *Journal of geophysical research*, Mar. 27, 1997, 102(D6), p.6953-6970, 52 refs.

The effects of clouds, the continental ice sheet, and sea ice on the radiation budget in the Antarctic are examined by using Earth Radiation Budget Experiment, International Satellite Cloud Climatology Project, and special sensor microwave/imager data in 1987-88. The continental ice sheet affects not only the albedo but also the surface temperature because of elevation and hence the outgoing longwave radiation (OLR). The high elevation of the antarctic continent makes the radiation budget in both polar regions asymmetric. Cloud forcing increases the albedo by 0.3 and reduces the OLR by 30-40 W/M<sup>2</sup>. However, these numbers do not fully differentiate the independent effects of sea ice and cloudiness. A more detailed analysis shows that the independent effect of sea ice is as large as clouds, with clouds masking the radiative effect of sea ice by more than one half. (Auth. mod.)

#### I-57222

Yiou, P., Baert, E., Loutre, M.F., **Spectral analysis of climate data**, *Surveys in geophysics*, Nov. 1996, 17(6), p.619-663, Refs. p.658-663.

The complexity of climate variability on all time scales requires the use of several refined tools to unravel its primary dynamics from observations. The authors review the properties of several modern time series analysis methods. Those methods belong to four main classes: Fourier techniques (Blackman-Tukey and Multi-Taper), Maximum Entropy technique, Singular-spectrum techniques and wavelet analysis. Their respective advantages and limitations are illustrated by numerical experiments on synthetic time series. As climate data can be irregularly spaced in time, three interpolating methods on those time series are also compared. These tests are aimed at showing the pitfalls of the blind use of mathematical or statistical techniques on climate data. The authors apply those methods to 'real' climatic data from temperature variations over the last century, and the Vostok ice core deuterium record over the last glacial cycle. Then it is shown how interpretations on the dynamics of climate can be derived on those time scales. (Auth. mod.)

#### I-57241

Kamalabadi, F., Forbes, J.M., Makarov, N.M., Portniagin, I.U.I., **Evidence for nonlinear coupling of planetary waves and tides in the antarctic mesopause**, *Journal of geophysical research*, Feb. 27, 1997, 102(D4), p.4437-4446, 24 refs.

Analyses of hourly-mean meridional and zonal winds near 95 km, observed with the meteor radar system at Molodezhnaya Station during 1990, reveal the presence of long-period (2-18 day) waves with dominant periods corresponding to those of Rossby normal modes modified by mean zonal winds. Time-varying analyses indicate that although significant contributions at planetary wave periods persist with nearly constant periods for intervals of days to weeks, temporal variability of these periods is observed over longer intervals. Tidal motions, which mainly consist of the semidiurnal and the diurnal periods, demonstrate considerable modulation of their amplitudes that vary with time. The observed tidal amplitude modulations are investigated through bispectral analyses. The results of these analyses suggest nonlinear interactions of quadratic form between oscillations with periods in the range of 2 to 19 days and the diurnal and semidiurnal tides at various intervals during 1990. (Auth. mod.)

#### I-57242

Wendler, G., Stearns, C., Weidner, G., Dargaud, G., Parish, T., **On the extraordinary katabatic winds of Adélie Land**, *Journal of geophysical research*, Feb. 27, 1997, 102(D4), p.4463-4474, 42 refs.

In Dec. 1992, the authors placed four automatic weather stations along the coast of Adélie Land, two in the maximum wind jet (Port Martin and Cape Denison) and one on each side of this jet (D 10 close to Dumont d'Urville and Penguin Point, respectively). Wind velocities are discussed as a function of other meteorological parameters. Further, the interrelationships between the stations are described. Some of the findings are (1) the very high wind speeds reported earlier this century are in agreement with the measurements; the wind directional constancy is high; (2) historic measurements reported Cape Denison to be the windiest station, not only for Antarctica, but also close to sea level for planet Earth; (3) very strong

wind speeds have a more down-slope direction than weaker ones; (4) the general atmospheric pressure gradient enhanced or inhibited the gravity flow; this is especially pronounced in summer; and (5) in summer, above normal pressure is correlated with above normal temperatures; in fall the opposite holds true. (Auth. mod.)

#### I-57258

Bromley, A.M., **Climate of Scott Base 1957-1992**, *National Institute of Water and Atmospheric Research*, [1994], NIWA/Clim/R/94-002, p.1-20, 5 refs.

This paper presents data from synoptic and climatological weather observations carried out from Jan. 1957 through Dec. 1992 at Scott Base. Tabulated data on temperature, including mean air temperature, frequency distributions, annual amplitude and extreme temperatures, temperature anomalies, surface wind and precipitation, including days of snow by month and days of fog by month, are discussed and illustrated.

#### I-57259

Tziperman, E., **Inherently unstable climate behaviour due to weak thermohaline ocean circulation**, *Nature*, Apr. 10, 1997, 386(6625), p.592-595, 31 refs.

It is argued here, using a global coupled ocean-atmosphere-ice general circulation model with realistic geography, that there is a wide range of weak mean states of the THC that cannot be stably sustained by the climate system. When the model THC is forced into a state in the unstable range, the THC may rapidly strengthen, collapse or display strong oscillations. The existence of this unstable regime may account for the greater variability of the THC and climate before the Holocene period. The area of coverage includes data from both northern and southern polar regions. (Auth. mod.)

#### I-57265

Keller, L.M., Weidner, G.A., Stearns, C.R., Whittaker, M.T., Holmes, R.E., **Antarctic automatic weather station data for the calendar year 1995**, Madison, University of Wisconsin, 1997, 33p.

A network of automatic weather station (AWS) units has been deployed to collect antarctic surface weather observations in support of specific meteorological research projects as well as operational activities at McMurdo Station. The 1995 network consisted of 48 installed AWS units providing observations on the Ross Ice Shelf, east of the Transantarctic Mountains and north of McMurdo to the Adélie Coast, along the Antarctic Peninsula and climatological locations such as the South Pole. Each unit measures air temperature, wind speed, and wind direction at a nominal height of 3 m and air pressure at the electronics enclosure. Some AWS units also measure the relative humidity at 3 m and vertical air temperature difference between 0.5 and 3 m. Measurement heights relative to the actual surface at the site are nominal due to snow accumulation around the AWS unit.

#### I-57270

Buzzi, A., Cadelli, R., Malguzzi, P., **Low-level jet simulation over the southern ocean in Antarctica**, *Tellus*, Mar. 1997, 49A(2), p.263-276, 28 refs.

The authors have examined the dynamical characteristics of an intense topographic low level jet (LLJ) that develops in high-resolution numerical simulations of airflow in the antarctic region. The jet forms off Cape Adare (Victoria Land) over the southern ocean, when a large scale cyclone is present in the region of the Ross Sea and adjacent ocean. A low level easterly airflow is directed towards the portion of Transantarctic Mountains located along the west coast of the Ross Sea, inducing a barrier wind airflow which is locally parallel to the topographic barrier. By means of numerical experiments and model output diagnostics, they have investigated the time evolution of different meteorological parameters, and in particular those relevant for the vorticity budget, associated with the LLJ formation. (Auth. mod.)

#### I-57272

Gong, S.L., et al, **Modeling sea-salt aerosols in the atmosphere 2. Atmospheric concentrations and fluxes**, *Journal of geophysical research*, Feb. 20, 1997, 102(D3), p.3819-3830, 21 refs.



Atmospheric sea-salt aerosol concentrations are studied using both long-term observations and model simulations of  $\text{Na}^+$  at seven stations around the globe, including Palmer Station. Good agreement is achieved between observations and model predictions in the Northern Hemisphere. A stronger seasonal variation occurs in the high-latitude North Atlantic than in regions close to the equator and in high-latitude Southern Hemisphere. Generally, concentrations are higher for both boreal and austral winters. With the model, the production flux and removal flux at the atmosphere-ocean interface was calculated and used to estimate the global sea-salt budget. The flux also shows seasonal variation similar to that of sea-salt concentration. Approximately 99% of the sea-salt aerosol mass generated by wind falls back to the sea with about 1-2% remaining in the atmosphere to be exported from the original grid square. Only a small portion of that exported (ca. 4%) is associated with submicron particles that are likely to undergo long-range transport. (Auth. mod.)

#### I-57273

Kawa, S.R., et al, **Activation of chlorine in sulfate aerosols as inferred from aircraft observations**, *Journal of geophysical research*, Feb. 20, 1997, 102(D3), p.3921-3933, Refs. p.3931-3933.

The abundance of reactive chlorine in the lower stratosphere is observed to increase sharply with exposure to temperatures below about 195 K, a temperature which is near the nitric acid trihydrate (NAT) equilibrium condensation point. Measurements from the NASA ER-2 aircraft and a model of chemistry along back trajectories are used to examine the mechanism for this apparent temperature threshold in chlorine activation. The flight of July 28, 1994, from the Airborne Southern Hemisphere Ozone Experiment/Measurements for Assessing the Effects of Stratospheric Aircraft campaign in the Southern Hemisphere, surrounding Antarctica, is studied because it provides measurements in an ongoing activation episode. The measurements show enhanced ClO and decreased HCl at temperatures below 195 K even in the absence of significant polar stratospheric cloud particle surface area. The model of chemistry along back trajectories, constrained by the ER-2 chemical and microphysical measurements, indicates that an initial inorganic chlorine ( $\text{Cl}_y$ ) partitioning of approximately half HCl and half  $\text{ClONO}_2$  is consistent with the observations. At this initial  $\text{Cl}_y$  partitioning, the model using heterogeneous reactions on liquid sulfate and ternary solutions with the most recent sticking coefficient evaluations closely reproduces the latitude gradient and temperature threshold of chlorine activation observed in the data. (Auth. mod.)

#### I-57274

Gao, R.S., et al, **Partitioning of the reactive nitrogen reservoir in the lower stratosphere of the southern hemisphere: observations and modeling**, *Journal of geophysical research*, Feb. 20, 1997, 102(D3), p.3935-3949, 61 refs.

Measurements of nitric oxide (NO), nitrogen dioxide ( $\text{NO}_2$ ), and total reactive nitrogen were made during austral fall, winter, and spring 1994 as part of the NASA Airborne Southern Hemisphere Ozone Experiment/Measurements for Assessing the Effects of Stratospheric Aircraft mission. Comparisons between measured  $\text{NO}_2$  values and those calculated using a steady state (SS) approximation are presented for flights at mid- and high latitudes. The SS results agree with the measurements to within 8%, however,  $\text{NO}_2$  values observed in the Concorde exhaust plume were significantly less than SS values. Model comparisons using a full diurnal, photochemical steady state model also show good agreement with the NO and  $\text{NO}_2$  measurements, suggesting that the reactions affecting the partitioning of the  $\text{NO}_y$  reservoir are well understood in the lower stratosphere. (Auth. mod.)

#### I-57275

Midya, S.K., Ganda, S.C., Tarafdar, G., Das, T.K., **Nature of variation of antarctic  $\text{O}_3$  depletion and its correlation with solar UV radiation**, *Earth, moon and planets*, Feb. 1996, 74(2), p.109-113, 5 refs.

The purpose of this paper is to study the nature of variation of  $\text{O}_3$  concentration at antarctic stations and its correlation with solar ultraviolet radiation. Solar UV data for the period Nov. 1988 to Oct. 1994 are taken from the Solar Geophysical Data Book. In the absence of long period solar UV data, a calibration curve between solar UV radiation and solar flare number (S.F.N.O.) is drawn. The straight line equation from the least

squares principle becomes,  $\text{UV flux} = 0.2672 + 2.7578 \times 10^{-5} \times \text{S.F.N.O.}$ . From this equation, long period UV flux values are calculated from known values of solar flare numbers.  $\text{O}_3$  concentration of two antarctic stations, Halley Bay and McMurdo, is considered for analysis and these results are obtained: (i) Yearly variations of  $\text{O}_3$  concentrations and UV radiation are mainly controlled by their October concentrations; (ii) Correlation coefficient between  $\text{O}_3$  concentration and UV radiation is 62% for the month of October. For the other months it is poor. (iii) It is concluded that the dramatic decrease of  $\text{O}_3$  over Antarctica is independent of solar UV radiation and chemical processes are responsible for the special depletion of  $\text{O}_3$ . (Auth. mod.)

#### I-57305

Sakunov, G.G., Blium, E.M., **Some features of the formation of the ozonosphere over the Mirnyy observatory in 1989** [Nekotorye osobennosti formirovaniia ozonosfery nad observatoriei Mirnyi v 1989 g.], *Rossiiskaia Antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No.117, p.5-10, In Russian. 3 refs.

Stratospheric ozone in the 20-50 km layer was measured by the Mirnyy observatory using balloon sondes and radiophysical methods. An analysis of the observational data is presented, showing the characteristics of the changes over time of some of the atmospheric components being studied. A close link was found between the variation in the amount of ozone and the air temperature at various layers, with a maximum amplitude of variation during the spring recovery of the thermobarometric field at a height of 15-30 km. The "ozone hole" can be said to have finally closed on 27th November. Data on the monthly total ozone content, the monthly characteristics of stratospheric ozone, the correlation coefficient between the amount of ozone and the temperature, and the average daily total ozone are presented in tables, and the vertical profiles of ozone and air temperature are presented in figures.

#### I-57306

Evseev, M.P., **Characteristics of the long period variation in the spectral amplitude of the 500 millibar level in the troposphere above the southern hemisphere, and the possibility of using it for monthly meteorological forecasting in Antarctica** [O kharaktere dolgoperiodnykh kolebaniï spektral'nykh amplitud geopotentsiala  $H_{500}$  v troposfere iuzhnogo polushariia i vozmozhnost' ikh ispol'zovaniia dlia meteorologicheskogo prognoza v Antarktike na mesiats], *Rossiiskaia Antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No.117, p.10-17, In Russian. 5 refs.

The author presents data on a number of events arising from the 30-to-40-day variation in the spectral oscillation mode of the 500 millibar level, including the characteristic amplitude and dispersion from the general oscillation spectra (as a percentage variation) over the period 1981-1984. The results of a harmonic analysis of the daily most significant spectral mode of the 500 millibar level over the Southern Hemisphere for 1980-1981 are also given. A calculation of the amplitude and phase of the "significant" 30-to-45-day variation provides an indication of the predominant (cyclonic or anticyclonic) field and of the wind regime in various sectors of the Antarctic. The monthly calculation of such indicators in advance could be of great help in the planning and organization of long-term work in high latitudes.

#### I-57307

Sakunov, G.G., Blium, E.M., Savitskii, G.B., **Transparency of the atmosphere over the Bunger Oasis** [Prozrachnost' atmosfery nad oazisom Bangera], *Rossiiskaia Antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No.117, p.17-21, In Russian. 10 refs.

Measurements of the spectral aerosol optical density and the atmospheric moisture content were carried out over the Soviet station at Bunger Oasis between 9th February and 4th March 1990, in order to investigate the reason for the apparent transparency of the atmosphere in the immediate vicinity. Results indicated that the greater transparency is probably caused by a decrease in aerosols due to the difference in climatic conditions between the observatory at Mirnyy Station, which is frequently subjected to the advection of air masses from the ocean, and Bunger, where the prevailing air originates from the antarctic land mass, and which is also



further from the coast. Comparative data on the integral coefficient of transparency are given for Bunger and Mirnyy stations, as are the average values for the optical aerosol thickness of the atmosphere, and the resulting decrease in solar radiation.

#### I-57308

Lutsenko, E.I., **Possibility of using satellite data on cloud conditions in the analysis of areas of atmospheric pressure in Antarctica** [Vozmozhnost' ispol'zovaniia sputnikovykh dannykh ob oblachnosti v analize polei atmosfernogo davleniia v Antarktike], *Rossiiskaia Antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No. 117, p.21-26, In Russian. 5 refs.

Photomontages of satellite data on cloud conditions between 1970 and 1990 can be used to improve the analysis of pressure areas and winds in high southern latitudes. The various types of cyclonic cloud vortex are classified as either young, developed, occluded, or old cyclonic, and the pressure at the center of a cyclonic vortex can be predicted from its type and its dimensions. Trials have shown that winds in the ocean boundary layer can be predicted using satellite images of cloud cover, and the method is useful in calculating winds and pressure areas in the southern Pacific Ocean.

#### I-57309

Sobolev, S.N., Lutsenko, E.I., **Investigation of the energetics of active cyclones of the Southern Hemisphere using data from more frequent atmospheric soundings** [Issledovaniia energetiki aktivnykh tsiklonov iuzhnogo polushariia po materialam uchashchennogo zondirovaniia atmosfery], *Rossiiskaia Antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No. 117, p.26-34, In Russian. 7 refs.

In order to improve the accuracy of weather forecasting in Antarctica, data from a special series of atmospheric soundings taken during the southern ocean cruise of *Professor Vize* are used to investigate the development of cyclones. The authors present calculations of the kinetic, potential, and internal energy volumetric densities of the early stages of cyclones, and traces changes in the energy balance over a 48-hour period. The results are compared with similar studies in the Northern Hemisphere.

#### I-57329

Mlynczak, M.G., Russell, J.M., III, **Overview of the SABER experiment for the TIMED mission**, *Technical digest series*, 1995, Vol.2, Optical Remote Sensing of the Atmosphere. Topical Meeting, Salt Lake City, UT, Feb. 5-9, 1995. Postconference edition, p.5/MA2-1-MA2-3/7, 5 refs.

#### DLC QC871.O67 1995

The Sounding of the Atmosphere Using Broadband Emission Radiometry (SABER) experiment has been selected for flight on the Thermosphere-Ionosphere-Mesosphere Energetics and Dynamics (TIMED) mission expected to fly in the latter part of this decade. The primary science goal of SABER is to achieve fundamental and important advances in understanding of the energetics, chemistry, and dynamics, in the atmospheric region extending from 60 km to 180 km altitude, which has not been comprehensively observed on a global basis. These measurements will be used to infer atomic hydrogen and atomic oxygen, the latter inferred three different ways using only SABER observations. Measurements will be made both night and day over the latitude range from the southern to northern polar regions. (Auth. mod.)

#### I-57330

Smith, W.L., Huang, H.L., Ma, X.L., Woolf, H.M., Revercomb, H.E., **High resolution Interferometer Sounder - An accurate method for profile retrieval without the use of contemporary "first guess" data**, *Technical digest series*, 1995, Vol.2, Optical Remote Sensing of the Atmosphere. Topical Meeting, Salt Lake City, UT, Feb. 5-9, 1995. Postconference edition, p.38/MD1-1-MD1-3/40.

#### DLC QC871.O67 1995

The High resolution Interferometer Sounder (HIS), is a Michelson interferometer which observes the spectrum of infrared radiation with a spectral resolution better than 2000/l. During 1994, the HIS flew aboard the NASA ER-2 during a series of flights between Christchurch, New

Zealand and the antarctic ice shelf as part of the Airborne Southern Hemisphere Ozone Experiment (ASHOE). The intent of the HIS was to retrieve atmospheric profiles of temperature, water vapor, and ozone beneath the aircraft (20 Km) flight level. Because of the extensive cloudiness over the southern oceans, a method had to be able to provide accurate retrievals above clouds, regardless of their altitude or their opacity. This paper describes the method developed for this application and provides results from the spectral radiance data obtained during the ASHOE to demonstrate their accuracy.

#### I-57332

Liu, X., Murcay, F.J., **N<sub>2</sub>O vertical profiles retrieved from ground-based solar absorption spectra taken at McMurdo Station during austral spring of 1989**, *Technical digest series*, 1995, Vol.2, Optical Remote Sensing of the Atmosphere. Topical Meeting, Salt Lake City, UT, Feb. 5-9, 1995. Postconference edition, p.96/TuC5-1-TuC5-3/98.

#### DLC QC871.O67 1995

N<sub>2</sub>O can be a tracer of atmospheric air motion due to its long life time. Ground-based FTIR solar spectra contain information on the vertical distributions of N<sub>2</sub>O due to pressure-broadening of absorption lines. The authors have combined the Chahine-Twomey relaxation method with a line-by-line layer-by-layer radiative transfer code to retrieve N<sub>2</sub>O VMR profiles from ground-based solar absorption spectra at McMurdo Station during spring of 1989 with a 0.02 wavenumber resolution FTIR spectrometer. Results are discussed and shown in figures.

#### I-57333

Pitts, M.C., Thomason, L.W., **Estimation of polar stratospheric cloud infrared extinction climatology using visible satellite observations**, *Technical digest series*, 1995, Vol.2, Optical Remote Sensing of the Atmosphere. Topical Meeting, Salt Lake City, UT, Feb. 5-9, 1995. Postconference edition, p.108/TuC9-1-TuC9-3/110, 4 refs.

#### DLC QC871.O67 1995

Polar stratospheric clouds (PSCs) provide surfaces for heterogeneous processes which can dramatically alter the normal partitioning of odd nitrogen and chlorine families in the winter polar stratospheres setting up conditions for significant ozone depletion as manifested in the springtime antarctic ozone hole. A new remote sensor, the Improved Limb Atmospheric Spectrometer (ILAS), is scheduled to be launched in 1996 on the Advanced Earth Observing Satellite (ADEOS) in a Sun-synchronous orbit. ILAS will be using solar occultation to observe the composition of the high-latitude upper troposphere and stratosphere in the infrared region and the near-visible region. Observations from the ILAS sensor may provide additional information on the climatology of PSC occurrence as well as information on PSC composition and type. In this study, the authors have estimated the optical signals of PSCs in the infrared and discuss the possibility of identifying PSC occurrences using the ILAS data, as well as the effect of PSCs on the ILAS retrieval of gaseous species.

#### I-57334

Rosenfield, J.E., Considine, D.B., Meade, P.E., Bacmeister, J.T., Jackman, C.H., Schoeberl, M.R., **Stratospheric effects of Mount Pinatubo aerosol studies with a coupled two-dimensional model**, *Journal of geophysical research*, Feb. 20, 1997, 102(D3), p.3649-3670, Refs. p.3668-3670.

A new interactive radiative-dynamical-chemical zonally averaged two-dimensional model has been developed at Goddard Space Flight Center. The model includes a linear planetary wave parameterization featuring wave-mean flow interaction and the direct calculation of eddy mixing from planetary wave dissipation. It utilizes family gas phase chemistry approximations and includes heterogeneous chemistry on the surfaces of both stratospheric sulfate aerosols and polar stratospheric clouds in both polar regions. This model has been used to study the effects of the sulfate aerosol cloud formed by the eruption of Mount Pinatubo in June 1991 on stratospheric temperatures, dynamics, and chemistry. The net predicted perturbations to the column ozone amount were low-latitude depletions of 2-3% and northern and southern high-latitude depletions of 10-12%, in good agreement with observations. The sensitivity of the predicted pertur-



bations to changes in the specification of the planetary wave forcings was examined. The maximum globally averaged column ozone depletions ranged from 2 to 4% for the cases studied. (Auth. mod.)

### I-57336

Zhong, W.Y., Toumi, R., Haigh, J.D., **Climate forcing by stratospheric ozone depletion calculated from observed temperature trends**, *Geophysical research letters*, Nov. 1, 1996, 23(22), p.3183-3186, 25 refs.

The radiative forcing of the surface-troposphere system caused by stratospheric ozone depletion in the 1980s is calculated using observed values of change in ozone and temperature. The seasonal variation of the ozone and temperature trends produces strong seasonal and latitudinal variations in radiative forcing. The balance between peak positive solar forcing and maximum negative longwave forcing shifts the peak negative forcing at the South Pole from Nov. to Oct. The time difference between peak ozone loss and maximum temperature decrease results in net positive values in Southern Hemisphere mid-latitudes in Aug. and Sep. Positive values also occur at low latitudes in both hemispheres. The globally and annually averaged net radiative forcing is much less than that previously reported using fixed dynamical heating model temperature changes. Ozone radiative forcing is very sensitive to the vertical profile of temperature change. (Auth. mod.)

### I-57337

Feigin, A.M., Konovalov, I.B., **On the possibility of complicated dynamic behavior of atmospheric photochemical systems: instability of the antarctic photochemistry during the ozone hole formation**, *Journal of geophysical research*, Nov. 20, 1996, 101(D20), p.26,023-26,038, 52 refs.

The authors suggest a new approach to studying atmospheric photochemical processes by analyzing an atmospheric photochemical system as a dynamic system possessing many degrees of freedom and demonstrate a good agreement between the antarctic photochemical system (APCS) behavior described by a three-order set of ordinary differential equations and ozone variations taking place during ozone hole phenomenon. The dynamic properties of this set under the parameter values corresponding to the antarctic stratosphere conditions during the last decade show that APCS may become unstable as a result of the loss of equilibrium state stability and/or as a result of the self-oscillations appearance. Some arguments are presented in favor of close connection between the APCS instability and anomalous deep depletion of antarctic ozone concentration in spring observed since the mid-1980s. (Auth. mod.)

### I-57338

Levchenko, V.A., et al,  **$^{14}\text{C}$  "bomb spike" determines the age spread and age of  $\text{CO}_2$  in Law Dome firn and ice**, *Geophysical research letters*, Nov. 15, 1996, 23(23), p.3345-3348, 24 refs.

The authors report a precise, model-independent determination of the age and age spread of  $\text{CO}_2$  in air trapped in ice. A large pulse of atmospheric radiocarbon, generated in the atmosphere by nuclear tests, peaked in the early-to-mid 1960s. The profile of the radiocarbon "bomb spike" in firn air and ice bubbles from high snow-accumulation sites drilled in 1987 and 1993 in Law Dome, East Antarctica, is measured by employing high precision AMS (Accelerator Mass Spectrometry). Large  $^{14}\text{C}$  atmospheric growth rates and a high signal-to-noise ratio lead to a direct and precise determination of the  $\text{CO}_2$  age and age-spread in the ice. A least-squares comparison with the atmospheric history gives a mean  $\text{CO}_2$  age of  $8.9 \pm 0.5$  years at the bottom of the firn with an age spread in the ice of  $12.5 \pm 1.5$  years. These results confirm the possibility of examining decadal trace gas variations prior to direct instrumental measurements. (Auth. mod.)

### I-57339

Hirst, A.C., Gordon, H.B., O'Farrell, S.P., **Global warming in a coupled climate model including oceanic eddy-induced advection**, *Geophysical research letters*, Nov. 15, 1996, 23(23), p.3361-3364, 13 refs.

The Gent and McWilliams (GM) parameterization for large-scale water transport caused by mesoscale oceanic eddies is introduced into the oceanic component of a global coupled ocean-atmosphere model. Parallel simulations with and without the GM scheme are performed to examine the effect of this parameterization on model behavior under constant atmo-

spheric  $\text{CO}_2$  and on the model response to increasing  $\text{CO}_2$ . The transient (increasing  $\text{CO}_2$ ) runs show moderate differences in the rate of oceanic heat sequestration (less in the GM case), as expected based on passive tracer uptake studies. However, the surface warming is weaker in the GM case, especially over the southern ocean, which is contrary to some recent supposition. Reasons for the reduced warming in the GM case are discussed. (Auth. mod.)

### I-57363

Stolarski, R.S., Labow, G.J., McPeters, R.D., **Springtime antarctic total ozone measurements in the early 1970s from the BUV instrument on Nimbus 4**, *Geophysical research letters*, Mar. 1, 1997, 24(5), p.591-594, 13 refs.

Data from the Backscatter Ultraviolet (BUV) instrument on the Nimbus 4 satellite have been used to construct maps of the measured total ozone field over the antarctic region during the austral springs of 1970 through 1973. These maps show an October mean ozone distribution similar to that measured in 1979 by the Nimbus 7 TOMS instrument. These ozone maps during the 1970s are very different from those measured during the late 1980s and early 1990s. The ozone distribution for each of the years during the early 1970s is characterized by a circumpolar, crescent-shaped maximum surrounding a shallow minimum centered near the pole. The total ozone amounts in the polar minimum region in the early 1970s average about 300 Dobson units, comparable to the amounts measured at that time over Halley Bay and Showa Station. (Auth. mod.)

### I-57364

Goodman, J., Verma, S., Pueschel, R.F., Hamill, P., Ferry, G.V., Webster, D., **New evidence of size and composition of polar stratospheric cloud particles**, *Geophysical research letters*, Mar. 1, 1997, 24(5), p.615-618, 29 refs.

A NASA Ames ER-2 aircraft encountered polar stratospheric cloud particles in the Antarctic in July 1994 during the ASHOE/MAESA deployment. Stratospheric particles were collected by impaction techniques on specially treated substrates. For the first time, Nitron-nitrate reaction spots were detected on the ice crystal replicas, indicating the presence of  $\text{NO}_3^-$  ions on/in ice. Because the reaction spots were detected only on very small crystals ( $r < 1 \mu\text{m}$ ) and never on larger crystals, suggest that the amount of  $\text{NO}_3^-$  coating sufficient to initiate reactions will accumulate during ice crystal evaporation in ice subsaturated air. This may slow down the evaporation rate and enable ice crystals to survive longer in subsaturated environment. That provides an explanation of why on both days ice crystals were replicated at temperatures above the frost point, when their appearance and size suggest substantial evaporation. (Auth. mod.)

### I-57365

Mandolini, S., Adriani, A., **Software for estimating particles size distributions in polar stratospheric clouds from experimental data**, *Rome. Consiglio Nazionale delle Ricerche. Istituto di Fisica dell'Atmosfera*, July 1996, IFA R.I. 96-7, 23p., In Italian with English summary. 3 refs.

The software for estimating the parameters of the PSC's particle size distribution, from data gathered by an Optical Particle Counter (OPC), is described. This instrument, developed at the University of Wyoming, yields the concentration of the particles (assumed to be spherical) with radius greater than a fixed value. The OPC is balloon-borne and can be transported with other scientific instruments, such as the Laser Backscatter Sonde (LABS) developed in the Frascati laboratories of IFA-CNR. The parameters of the size distribution are used to make a comparison between the backscattering coefficient calculated by Mie theory and the one calculated by experimental values of LABS or a lidar. This makes an estimation of the refraction index possible. For estimating the parameters of the PSC's particle size distribution, the software improves, with a step by step process, the agreement between experimental data and the curve calculated from theory. (Auth. mod.)

### I-57366

Gera, B.S., Argentini, S., Mastrantonio, G., Viola, A., Weill, A., **Characteristics of the boundary layer thermal structure in a coastal region of Adélie Land, East Antarctica**, *Rome. Consiglio Nazionale delle Ricerche. Istituto di Fisica dell'Atmosfera*, Aug. 1996, IFA R.I. 96-11A, 30p., 16 refs.



The boundary layer thermal structure, observed through Doppler sodar at Dumont d'Urville Station, has been analyzed. Typical echograms of the spiky layers, wavy layers and thermal plumes, except for the eroding inversion, have been observed. The annual distribution of these thermal structures has been studied. The spiky layers indicate strong winds (mainly katabatic), flowing from the inner continent sector 90-180°. The height spiky layers is sensitive to changes in the wind direction; the maximum depths (more than 400 m) are confined to 60° wide span centered at 135°. The waves and the spiky layers tend to occur alternatively in accordance with the relative dominance of the katabatic flow intensity and stability. The sodar signatures of these structures are examined in relation to the onset and dissipation time, duration and the seasonal distribution. Both these phenomena occur at any hour of the day, with their maximum occurrence in winter months. The persistence of the waves varies from a couple of hours to a couple of days, while the spiky layers can occur for periods longer than 3-4 days. The characteristics of these phenomena are associated to the diurnal radiational cycle and the temperature contrast in proximity of the coast. (Auth. mod.)

#### I-57381

Tuniz, C., et al, **Research and measurement program at the ANTARES AMS facility**, *Nuclear instruments and methods in physics research B*, Mar. 1997, 123(1-4), International Conference on Accelerator Mass Spectrometry (AMS-7), Tucson, AZ, May 20-24, 1996. Proceedings, p.73-78, 11 refs.

The ANTARES AMS facility is fully operational and supports a research program in environmental science, with emphasis on global climate change and nuclear safeguards. A measurement program for external projects involving Australian and overseas institutions is also carried out, mainly in Quaternary science studies. Some selected projects of the program, including research in Antarctica, are outlined. (Auth. mod.)

#### I-57384

Mikhailov, N.F., Shchukin, G.G., **Radiometric estimation of tropospheric refraction: some results of atmospheric moisture sounding**, Specialist Meeting on Microwave Radiometry and Remote Sensing Applications, Boulder, CO, June 1992. Mrad 92., Boulder, U.S. National Oceanic and Atmospheric Administration, 1992, p.372-375, 4 refs.

#### DLC G70.39.S65

Characteristics of radiothermal emission of the atmosphere in polar regions at small elevation angles and the connection between these characteristics and microwave propagation conditions are considered. Based on specific features of the polar atmosphere, a modification of the technique for radiometric refraction level estimation is proposed. Results of a complex experiment carried out in Antarctica are given. A year's data on refraction levels are presented, with values of refraction coefficients obtained by different methods being approximate. (Auth. mod.)

#### I-57397

Nishimura, J., **Recent achievement of long duration flights in Japan**, European Space Agency, ESA SP-355 and ESA Symposium on European Rocket and Balloon Programmes and Related Research, 11th, Montreux, Switzerland, May 24-28, 1993. Proceedings, Paris, Mar. 1994, p.71-74, 6 refs.

#### DLC TL785.8.S6E83

The "Polar Patrol Balloon" over Antarctica in summer season, which has been conducted by the collaboration of National Polar Institute and the Institute of Space and Astronautical Science (ISAS), is described. The balloons are launched at Showa Station, and the duration of flights to return to the launching area, is normally 2 to 3 weeks. The feasibility studies of new type of "Over Pressure Balloons" are performed together with the investigation of new balloon materials to save the ballast during the long duration flights. (Auth. mod.)

#### I-57398

Philbrick, C.R., Lysak, D.B., Stevens, T.D., Haris, P.A.T., Rau, Y.C., **Lidar measurements of middle and lower atmosphere properties during the LADIMAS campaign**, European Space Agency, ESA SP-355 and ESA Symposium on European Rocket and Balloon Programmes and Related Research, 11th, Montreux,

Switzerland, May 24-28, 1993. Proceedings, Paris, Mar. 1994, p.223-228, 19 refs.

The results of the Latitudinal Distribution of Middle Atmosphere Structure (LADIMAS) experiment have provided a unique data set to improve the understanding of the middle atmosphere properties. The project included coordinated ship-board measurements between 70N and 65S and measurements at the Andoya rocket range to study the structure, dynamics and chemistry of the atmosphere. The cooperative study of the atmosphere was undertaken by researchers from several laboratories. Instruments were assembled aboard the German research vessel RV *Polarstern* while this vessel was sailing from the Arctic to the Antarctic between Oct. 8, 1991 and Jan. 2, 1992. An overview of the results from the PSU lidar investigation is presented here. (Auth. mod.)

#### I-57414

Lloyd, S.A., **Issues in stratospheric ozone depletion**, Cambridge, Harvard University, 1993, 351p., University Microfilms order No. 94-21961, Ph.D. thesis. 44 refs.

Following the announcement of the discovery of the antarctic ozone hole in 1985 there have arisen a multitude of questions pertaining to the nature and consequences of polar ozone depletion. This thesis addresses several of these specific questions, using both computer models of chemical kinetics and the Earth's radiation field as well as laboratory kinetic experiments. A coupled chemical kinetic-radiative numerical model was developed to assist in the analysis of *in situ* field measurements of several radical and neutral species in the polar and mid-latitude lower stratosphere. Such modeling was instrumental in establishing the link between the observed ClO and BrO concentrations in the antarctic polar vortex and the observed rate of ozone depletion. The principal medical concern of stratospheric ozone depletion is that ozone loss will lead to the enhancement of ground-level UV-B radiation. Global ozone climatology was incorporated into a radiation field model to calculate the biologically accumulated dosage (BAD) of UV-B radiation, integrated over days, months, and years. The slope of the annual BAD as a function of latitude was found to correspond to epidemiological data for non-melanoma skin cancers.

#### I-57419

Manning, M.R., Pearman, G.I., Etheridge, D.M., Fraser, P.J., Lowe, D.C., Steele, L.P., **Changing composition of the atmosphere**, Greenhouse: coping with climate change. Edited by W.J. Bouma, G.I. Pearman and M.R. Manning, Collingwood, CSIRO Australia, 1996, p.3-26, Refs. p.22-26.

#### DLC QC981.8.C5G728 1996

This paper reviews changes that have occurred in the atmospheric levels of major greenhouse gases and consequent changes to heating of the lower atmosphere through the enhanced greenhouse effect. Ozone is a greenhouse gas which is produced by chemical reactions in the atmosphere. Emissions of CFCs have decreased ozone in the stratosphere, whereas emissions of nitrogen oxides and volatile organic compounds have increased ozone in the troposphere, at least in the Northern Hemisphere. Global atmospheric chemistry models indicate that changes in ozone over the last 200 years have probably contributed more to the enhanced greenhouse effect than changes in nitrous oxide or CFCs. (Auth. mod.)

#### I-57420

McGlone, M., Hope, G., Chappell, J., Barrett, P., **Past climatic change in Oceania and Antarctica**, Greenhouse: coping with climate change. Edited by W.J. Bouma, G.I. Pearman and M.R. Manning, Collingwood, CSIRO Australia, 1996, p.81-99, Refs. p.96-99.

#### DLC QC981.8.C5G728 1996

Long climate records from deep sea sediments and polar ice caps show that the last few million years have been dominated by quasi-regular glacial-interglacial cycles. The current climatic regime that established between 3000 and 2000 years ago is highly variable. High resolution records show some decades and centuries have had higher or lower than average numbers of warmer or wetter years, but there have been no sustained periods of highly deviant climate. The warming of recent decades is an unusual event as shown by the long-term perspective of these records. Palaeorecords show the antarctic region to be highly sensitive to warming and, with future warming, sea ice extent could be dramatically reduced.



On a much longer timescale, the unstable West Antarctic Ice Sheet could be vulnerable to collapse because of the effects of rising sea levels. (Auth. mod.)

#### I-57429

Mork, K.A., Skagseth, O., **Modelling the ocean response to secular surface temperature transitions**, *Climate dynamics*, Sep. 1996, 12(10), p.653-666, 40 refs.

The ocean response to surface temperature transients is simulated with the use of the Hamburg large-scale geostrophic ocean general circulation model. The transition, from the present to a climate corresponding to a doubling of the atmospheric CO<sub>2</sub> content, is compared with the reversed transition. For the Atlantic, the time scale for the deep ocean to adjust to the temperature changes was similar for both transitions. In the Pacific, the time scale is shorter for the present to warm transition than for the reverse case, a result of increased production of Antarctic Bottom Water during the warm climate. While the transition from cold to warm climate shows no secular variability, the reversed transition generates considerable variability on time scales of 300-400 years. For the warm climate, oscillations with periods of 45 years are found in the southern ocean. Results of principal oscillation pattern analysis indicate that these oscillations are due to interaction between convection in the southern ocean and advected salinity anomalies in the Antarctic Circumpolar Current and the Southern Pacific Ocean. (Auth. mod.)

#### I-57430

Johns, T.C., et al, **Second Hadley Centre coupled ocean-atmosphere GCM: model description, spinup and validation**, *Climate dynamics*, Feb. 1997, 13(2), p.103-134, Refs. p.132-134.

This study describes a new coupled ocean-atmosphere general circulation model (OAGCM) developed for studies of climate change and results from a hindcast experiment. The model includes various physical and technical improvements relative to an earlier version of the Hadley Centre OAGCM. Including sea ice advection and enhancing reference surface salinities in antarctic latitudes in austral winter to promote bottom water formation during spinup appears to have stabilized the high-latitude drift exhibited in the earlier model's control run. These allow validation of the model against the instrumental climate record. Inclusion of aerosol forcing gives a significantly better simulation of historical temperature patterns, although comparisons against recent sea ice trends are equivocal. These studies emphasize the potential importance of including additional forcing terms apart from greenhouse gases in climate simulations, and refining estimates of their spatial distribution and magnitude. (Auth. mod.)

#### I-57431

Guilyardi, E., Madec, G., **Performance of the OPA/ARPEGE-T21 global ocean-atmosphere coupled model**, *Climate dynamics*, Feb. 1997, 13(2), p.149-165, 56 refs.

The climatology of the OPA/ARPEGE-T21 coupled general circulation model (GCM) is presented. The mean state and seasonal cycle for the last 10 years of the experiment are described and compared to the corresponding uncoupled experiments and to climatology when available. The model reasonably simulates most of the basic features of the observed climate. Energy budgets and transports in the coupled system, of importance for climate studies, are assessed and prove to be within available estimates. After an adjustment phase of a few years, the model stabilizes around a mean state where the tropics are warm and resemble a permanent ENSO, the southern ocean warms and almost no sea-ice is left in Antarctica. The stability of the model is shown to be related to qualities already present in the uncoupled GCMs used, namely a balanced radiation budget at the top-of-the-atmosphere and a tight ocean thermocline. (Auth. mod.)

#### I-57435

Fiocco, G., ed, Fuà, D., ed, Visconti, G., ed, **Mount Pinatubo eruption: effects on the atmosphere and climate**, North Atlantic Treaty Organization. Advanced Science Institutes. NATO ASI Series I: Global Environmental Change, Vol.42, Berlin, Springer-Verlag, 1996, 310p., Refs. passim. Proceedings of the NATO Advanced Research Workshop on the Effects of the Mount Pinatubo Eruption on the Atmosphere and Climate, Rome, Italy, Sep. 26-30, 1994. For selected papers see I-57436 through I-

57439 or 51-4091 through 51-4093.

**DLC QC981.8.V65N38 1996**

The book contains a collection of papers presented at the NATO Advanced Research Workshop on "The Effects of the Mt. Pinatubo Eruption on the Atmosphere and Climate", held in Rome, Italy on Sep. 26-30, 1994. Four of the papers are pertinent to Antarctica.

#### I-57436

Fiocco, G., et al, **Evolution of the Pinatubo stratospheric aerosol layer observed by lidar at South Pole, Rome, Thule: a summary of results**, Mount Pinatubo eruption: effects on the atmosphere and climate. North Atlantic Treaty Organization. Advanced Science Institutes. NATO ASI Series I: Global Environmental Change, Vol.42. Edited by G. Fiocco, D. Fuà and G. Visconti, Berlin, Springer-Verlag, 1996, p.17-32, 12 refs.

**DLC QC981.8.V65N38 1996**

Stratospheric aerosol observations have been carried out with 3 lidars, in the period preceding and following the eruption of Mt. Pinatubo. The lidars were located at South Pole, Rome and Thule. The detailed analysis of the results is still under way: their general features and highlights are summarized in this paper. The aerosol backscattering data show the global evolution of the volcanic aerosol cloud in relation to the general circulation of the atmosphere and to microphysical processes. Other inferred parameters are the mass, the center of mass of the cloud, and the size distribution of the aerosol. Correlations between the aerosol and the ozone contents, found after all main eruptions since 1962, have been confirmed. Large effects on polar stratospheric cloud activity have been recorded. (Auth.)

#### I-57437

Jones, P.D., Kelly, P.M., **Effect of tropical explosive volcanic eruptions on surface air temperature**, Mount Pinatubo eruption: effects on the atmosphere and climate. North Atlantic Treaty Organization. Advanced Science Institutes. NATO ASI Series I: Global Environmental Change, Vol.42. Edited by G. Fiocco, D. Fuà and G. Visconti, Berlin, Springer-Verlag, 1996, p.95-111, Refs. p.110-111.

**DLC QC981.8.V65N38 1996**

The response of surface air temperatures to four major tropical explosive volcanic eruptions is identified. The common features of the average response (the composite) are then compared with the response to the Pinatubo eruption (1991), both for global average temperatures and for the spatial pattern. The cooling after Pinatubo was most marked over continental landmasses. Large cooling over the antarctic region occurred, which continued into 1993, making this year the third coldest recorded on the continent since records began in 1957 (only 1960 and 1962 were colder). It is suggested that the surface cooling might be related to the marked stratospheric cooling and the ozone depletion. (Auth. mod.)

#### I-57438

Godin, S., David, C., Guirlet, M., **Evolution of the Mt. Pinatubo volcanic cloud and analysis of its effect on the ozone amount as observed from ground-based measurements performed in northern and southern latitudes**, Mount Pinatubo eruption: effects on the atmosphere and climate. North Atlantic Treaty Organization. Advanced Science Institutes. NATO ASI Series I: Global Environmental Change, Vol.42. Edited by G. Fiocco, D. Fuà and G. Visconti, Berlin, Springer-Verlag, 1996, p.143-159, Refs. p.158-159.

**DLC QC981.8.V65N38 1996**

The decay of the Mt. Pinatubo volcanic cloud was monitored by systematic ground-based aerosol lidar systems implemented at the Observatoire de Haute-Provence and at the antarctic Dumont d'Urville Station. Additional backscatter lidar measurements were also performed during the EASOE campaign in Sodankylä. The analysis of the aerosol measurements obtained at the northern and southern polar latitudes shows that mixing can take place at the edge of the polar vortex in the lower stratosphere whereas the vortex remains mainly isolated above, especially in the Southern Hemisphere. The measurements performed in the winter and spring of 1992 at Dumont d'Urville allow one to evaluate the subsidence of air inside the vortex, at a rate of 1 km/month at the 475 K potential temperature level. (Auth. mod.)



**I-57439**

Hofmann, D.J., Solomon, S., **Observations and interpretation of changes in stratospheric ozone following the Pinatubo eruption**, Mount Pinatubo eruption: effects on the atmosphere and climate. North Atlantic Treaty Organization. Advanced Science Institutes. NATO ASI Series I: Global Environmental Change, Vol.42. Edited by G. Fiocco, D. Fuà and G. Visconti, Berlin, Springer-Verlag, 1996, p.177-188, 19 refs.

**DLC QC981.8.V65N38 1996**

Following the eruption of Mt. Pinatubo, substantial decreases were observed both in ozonesonde and total column ozone observations. These decreases are illustrated with data from mid-latitudes and polar regions (at the Amundsen-Scott Station), and are interpreted in terms of heterogeneous chemical processes, both involving hydrolysis of dinitrogen pentoxide and reactions involving chlorine species such as ClONO<sub>2</sub>, HOCl, and HCl on sulfate aerosols. In addition, this paper shows in detail for the first time how the ozone budget varies with altitude in response to sulfate aerosol perturbations, revealing the reasons for observed increases in ozone above about 25 km following the eruption. It is suggested that the possible effect of volcanic aerosol on ozone in Antarctica will be felt mainly in the lower stratosphere because of subsidence of the aerosol layer in the vortex during winter. (Auth. mod.)

**I-57450**

Pearce, F., **Southern oceans hold key to climate**, *New scientist*, Apr. 5, 1997, 154(2076), p.21.

The waxing and waning of ocean currents almost as far south as Antarctica may have triggered regular growth spurts in antarctic ice sheets over the past 140,000 years. Researchers in Britain and Germany studying fossilized protozoans in the southern Atlantic say that their finding may lead to better predictions of the rate of global warming. (Auth.)

**I-57471**

Vial, F., et al, **STRATÉOLE experiment project**, European Space Agency, ESA SP-370 and ESA Symposium on European Rocket and Balloon Programmes and Related Research, 12th, Lillehammer, Norway, May 29-June 1, 1995. Proceedings, Noordwijk, The Netherlands, 1995, p.355-360, For another version of this article see I-56378. 19 refs.

**DLC QC879.59.A1E83 1995**

The STRATÉOLE experiment is designed to study the wintertime antarctic lower stratosphere polar vortex and its springtime breakdown. To this end, it is planned to fly a large number (around 200) of long-lived (3 months), small isopycnic drifting balloons instrumented with temperature and pressure sensors, GPS and transmitters. The main goal of STRATÉOLE experiment is to provide an unprecedented documentation of the wind field in the vicinity of the vortex edge in order to study vortex porosity and erosion, filamentation and mixing properties of the air masses. In addition, by the use of other sensors on some gondolas, like radiometers and tuneable laser diodes, STRATÉOLE will also provide *in-situ* and/or column-integrated trace species measurements (like NO<sub>2</sub>, O<sub>3</sub>, CH<sub>4</sub>, H<sub>2</sub>O, aerosols...) and information on the radiation budget of the antarctic lower stratosphere during this period. This will permit to obtain a better understanding of mechanisms responsible for ozone depletion occurring during the springtime vortex dilution. (Auth.)

**I-57483**

Brasseur, G.P., Tie, X.X., Rasch, P.J., Lefèvre, F., **Three-dimensional simulation of the antarctic ozone hole: impact of anthropogenic chlorine on the lower stratosphere and upper troposphere**, *Journal of geophysical research*, Apr. 20, 1997, 102(D7), p.8909-8930, 48 refs.

This paper presents a global three-dimensional transport-chemical model of the stratosphere which includes a representation of the formation of polar stratospheric clouds (PSCs) and heterogeneous reactions on the surfaces of PSCs and sulfate aerosols. The formation of the observed springtime "antarctic ozone hole" is well reproduced by the model. A maximum of 40% total ozone depletion occurs in Oct. Model calculations show that the calculated ozone depletion is not significantly modified when type I PSC particles are assumed to be liquid ternary solutions rather than solid nitric acid trihydrates. Ice particles (type II PSCs) sediment into

the troposphere, producing a large decrease in the concentrations of stratospheric HNO<sub>3</sub> and NO<sub>2</sub>. As a result, the conversion of ClO into ClONO<sub>2</sub> is reduced. The model results show that the ozone minimum observed in Antarctica several decades ago (preindustrial chlorine levels) is produced by (natural) dynamical processes. Under these conditions the polar ozone depletion caused by chemical processes was very small (maximum of 3%) in Oct. In Nov. the ozone concentration even increased above 22 km in response to PSC processes. (Auth. mod.)

**I-57484**

Hofmann, D.J., Oltmans, S.J., Harris, J.M., Johnson, B.J., Lathrop, J.A., **Ten years of ozonesonde measurements at the south pole: implications for recovery of springtime antarctic ozone**, *Journal of geophysical research*, Apr. 20, 1997, 102(D7), p.8931-8943, 32 refs.

In 1986, following identification of the springtime antarctic ozone hole phenomenon, the National Oceanic and Atmospheric Administration Climate Monitoring and Diagnostics Laboratory began a program of weekly ozone balloon soundings at the Amundsen-Scott Station at the south pole. Supplemented by additional flights during the springtime ozone-depletion period, this continuing program has provided annual estimates of the severity of the antarctic ozone-depletion phenomenon. This paper summarizes the 10-year history of these flights at the south pole and provides information on when the healing of the ozone hole will be observed. (Auth. mod.)

**I-57485**

Kirchoff, V.W.J.H., Casiccia, C.A.R., Zamorano B., F., **Ozone hole over Punta Arenas, Chile**, *Journal of geophysical research*, Apr. 20, 1997, 102(D7), p.8945-8953, 30 refs.

Three fundamental questions are addressed for the location of Punta Arenas, Chile: does the antarctic ozone hole extend over the city? if so, at what height is most of the ozone depleted? And by how much does the UVB radiation increase under ozone hole conditions? It is shown that Punta Arenas is affected by the antarctic ozone hole, even though it is a considerable distance away from the pole. In comparison with the average global trend, the yearly downward ozone trend at Punta Arenas is almost 5 times larger than the global average using the monthly Oct. averages. To obtain these figures, an ozone climatology of TOMS (Total Ozone Mapping Spectrometer) data from 1979 to 1992 has been used. (Auth. mod.)

**I-57493**

Stager, J.C., Mayewski, P.A., **Abrupt Early to Mid-Holocene climatic transition registered at the equator and the poles**, *Science*, June 20, 1997, 276(5320), p.1834-1836, 45 refs.

Paleoclimatic records from equatorial East Africa, Antarctica, and Greenland reveal that atmospheric circulation changed abruptly at the early to mid-Holocene transition to full postglacial conditions. A climatic reorganization occurred at all three sites between 8200 and 7800 years ago that lasted 200 years or less and appears to have been related to abrupt transitions in both marine and terrestrial records around the world. (Auth.)

**I-57504**

Lowe, D.C., Manning, M.R., Brailsford, G.W., Bromley, A.M., **1991-1992 Atmospheric Methane anomaly: southern hemisphere <sup>13</sup>C decrease and growth rate fluctuations**, *Geophysical research letters*, Apr. 15, 1997, 24(8), p.857-860, 31 refs.

Measurements of atmospheric methane from 1989-1996 at Baring Head, New Zealand, and at Scott Base, Antarctica show a seasonal cycle in the mixing ratio with a peak to peak amplitude of 28 ppb. δ<sup>13</sup>C values also show a seasonal cycle approximately 6 months out of phase with the mixing ratio cycle. A pronounced negative anomaly in δ<sup>13</sup>C occurred in 1992 with annual average values dropping from -47.08 per mill to -47.28 per mill. Although a combination of causes cannot be ruled out, decreased emissions from an isotopically heavy source such as biomass burning best meet the constraints of the data. (Auth. mod.)

**I-57517**

Murata, A., Yamanouchi, T., **Distribution characteristics of clouds over East Antarctica in 1987 obtained from AVHRR**, *Meteorological Society of Japan. Journal*, Feb. 1997, 75(1), p.81-



93, With Japanese summary. 31 refs.

Detection of clouds in the polar regions involves many difficulties on account of the high albedo and low temperature of the snow and ice covered ground surface. Discrimination of clouds was done using AVHRR split window channel data. Brightness temperature differences were one of the indices of thin clouds; the correlation of the brightness temperature difference and the brightness temperature itself was used. The cloud analysis was done from daily NOAA-9 data for 13 months from Jan. 1987 to Jan. 1988, received and processed at Showa Station. Spatial and temporal distribution characteristics of clouds over the East Antarctic continent are discussed. Within the interior, cloud amounts were liable to be higher over the western slope facing the Weddell Sea compared to the eastern slope. An oscillation of about 7 or 15 days in the time variation of clouds was noticeable in most regions. Comparing the brightness temperature for clear and cloudy sky, the radiative effect of clouds at the top of the atmosphere was found to be negative (cooling) in winter in the interior, and small positive (heating) in the longwave in summer months over the whole area. (Auth. mod.)

#### I-57526

Pollock, D.E., **Role of diatoms, dissolved silicate and antarctic glaciation in glacial/interglacial climatic changes: a hypothesis**, *Global and planetary change*, Feb. 1997, 14(3-4), p.113-125, Refs. p.123-125.

A new theory is proposed to explain global cooling at the onset of Pleistocene glacial periods. Atmospheric CO<sub>2</sub> drawdown is considered to be the driving force behind global cooling, brought about by heightened productivity at the equatorial divergences and along continental margins, particularly in upwelling regions. Eutrophication appears to be triggered when global warming during late interglacial periods causes accelerated melting of the West Antarctic Ice Sheet. This would release large reserves of silicate-enriched subglacial meltwaters into the surrounding oceans where entrainment would take place into deep and intermediate currents forming in antarctic and subantarctic waters. Subsequent advection, mixing and upwelling of silicate-enriched deep and intermediate waters into the coastal zones and open-ocean divergences results in the proliferation of large, rapidly-sinking diatom species with a high affinity for dissolved silicate. These blooms enhance rates of recycling of N and P in upwelling regions and accelerate rates of organic carbon production, export and sequestration in shelf and slope sediments and in the deep sea. The resultant atm. CO<sub>2</sub> drawdown initiates global cooling. Consequent expansion of Northern Hemisphere glaciers lowers sea level, while increased temperature and pressure gradients between equatorial and polar regions intensify meridional winds. (Auth. mod.)

#### I-57528

Kuby, M.J., Cervený, R.S., Dorn, R.I., **New approach to paleoclimatic research using linear programming**, *Palaeogeography, palaeoclimatology, palaeoecology*, Apr. 1997, 129(3-4), p.251-267, Refs. p.266-267.

The authors computed 342 insolation time series for fitting to four different paleoclimatic records, including temperatures inferred from Vostok Station ice cores. Globally, high latitude insolation (60°-70° N and S) and insolation at specific times of day dominated the results. (Auth. mod.)

#### I-57531

Lachlan-Cope, T.A., Turner, J., **Passive microwave retrievals of precipitation over the southern ocean**, *International journal of remote sensing*, May 20, 1997, 18(8), p.1725-1742, 12 refs.

Many algorithms developed to retrieve precipitation and cloud liquid water from passive microwave measurement at mid-latitudes do not necessarily work well over the ice-free oceans that surround the antarctic continent where most precipitation falls in the form of snow. It is known that the clouds that produce most of the precipitation over the southern latitudes are thin stratiform clouds and the precipitation they give is of slight intensity. In this paper the polarization corrected temperature method for detecting precipitation is applied and compared with a new physical method that simultaneously retrieves both cloud liquid water and precipitation amount. Both methods are compared with the few *in situ* measurements available. The new iterative physical method is found to give better results and does not need any empirically derived parameters. (Auth. mod.)

#### I-57534

Brust, A.S., Zabel, F., Becker, K.H., **Integrated IR band intensities of the  $\nu_5$  and  $\nu_1$  bands of ClOOCl**, *Geophysical research letters*, June 1, 1997, 24(11), p.1395-1398, 19 refs.

The aim of the present work is to determine the integrated band intensities and absorption coefficients of the two strongest IR absorption bands of ClOOCl in the region 550-4000/cm, i.e. the  $\nu_5$  and  $\nu_1$  bands close to 650 and 750/cm, in order to explore the potential of IR absorption as a detection method for ClOOCl in the antarctic stratosphere. (Auth. mod.)

#### I-57536

Honda, H., Aoki, S., Nakazawa, T., Morimoto, S., Yajima, N., **Cryogenic air sampling system for measurements of the concentrations of stratospheric trace gases and their isotopic ratios over Antarctica**, *Journal of geomagnetism and geoelectricity*, 1996, 48(9), p.1145-1155, 21 refs.

In order to measure the concentrations of trace gases such as CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and halocarbons and the isotopic ratios of  $\delta^{13}\text{C}$ ,  $\delta^{18}\text{O}$  and  $\Delta^{14}\text{C}$  of CO<sub>2</sub> in the stratosphere over Antarctica in Jan. 1998, a balloon-borne cryogenic air sampling system was developed on the basis of the sampler which has been used for the collection of stratospheric air over Japan since 1985. The sampler developed in this study is capable of collecting air samples with volumes of 20-30 l<sub>STP</sub> at 12 height levels. Special attention was paid to the sampler so that the collection of a large amount of the stratospheric air can be completed in a short time, which is crucial for recovering the sampler near the station using a helicopter. In addition, the sampler was designed to land on the sea or the ice field safely. Flight trajectories of the sampler were also simulated using the wind data observed at Showa Station. The results suggested that the sampler may land within approximately 150 km from the station, if air sampling is made in the summer season. Indeed, the trajectories were validated by experiments made using a rubber balloon at Showa Station on Jan. 21 and Feb. 6, 1995. (Auth. mod.)

#### I-57543

Anthony, S.E., Onasch, T.B., Tisdale, R.T., Disselkamp, R.S., Tolbert, M.A., **Laboratory studies of ternary H<sub>2</sub>SO<sub>4</sub>/HNO<sub>3</sub>/H<sub>2</sub>O particles: implications for polar stratospheric cloud formation**, *Journal of geophysical research*, May 20, 1997, 102(D9), p.10,777-10,784, 27 refs.

It has recently been suggested that type Ib polar stratospheric clouds are composed of supercooled ternary-solutions of sulfuric acid (H<sub>2</sub>SO<sub>4</sub>), nitric acid (HNO<sub>3</sub>), and water (H<sub>2</sub>O). The authors have studied the low-temperature behavior of ternary-solution aerosols to determine if they will undergo homogeneous freezing nucleation under polar stratospheric conditions. Ternary-solution aerosols were injected into a low-temperature chamber and observed for periods of up to 3 hours. Fourier transform infrared spectroscopy was used to determine the aerosol composition and phase as a function of time. Ternary-solution aerosols with compositions similar to those expected in the polar stratosphere remained supercooled for the duration of the experiments. Homogeneous freezing of the particles was never observed, even after warming from 190 to 204 K. However, heterogeneous freezing was occasionally observed for particles adhering to the infrared optics within the chamber. (Auth. mod.)

#### I-57544

Watterson, I.G., O'Farrell, S.P., Dix, M.R., **Energy and water transport in climates simulated by a general circulation model that includes dynamic sea ice**, *Journal of geophysical research*, May 27, 1997, 102(D10), p.11,027-11,037, 32 refs.

The authors analyze energy and water transport in present, doubled CO<sub>2</sub>, and tripled CO<sub>2</sub> climates simulated by the Mark 2 CSIRO nine-level general circulation model with a mixed layer ocean to include the antarctic region. The model includes a dynamic sea ice, and a prescribed ocean heat transport, and describes a 30-year climatology of the 1 x CO<sub>2</sub> simulation, emphasizing the sea ice and the mean meridional energy and water transport. The ice depths, concentrations, and velocities are moderately realistic in both hemispheres. The model atmosphere transports less heat poleward in the doubled CO<sub>2</sub> climate, largely as a response to increased solar radiation absorbed at high latitudes. (Auth. mod.)



**I-57545**

Giovinetto, M.B., Yamazaki, K., Wendler, G., Bromwich, D.H., **Atmospheric net transport of water vapor and latent heat across 60°S**, *Journal of geophysical research*, May 27, 1997, 102(D10), p.11,171-11,179, 48 refs.

The mean annual moisture flux across 60°S is estimated using results of numerical analyses for the 7-year period 1985-1991. The atmospheric data indicate a net poleward transport of 17.06 kg/m/s or 10.74 Tt/yr. The mean annual moisture transport divergence for the area poleward of 60°S is estimated using a combination of surface and near-surface data (precipitation and evaporation for the southern ocean, net surface accumulation and seaward drifting snow transport for the antarctic ice sheet). The mass exchange rates at the ice sheet-atmosphere and ocean-atmosphere interfaces are integrated strictly for the area between 60°S and 70°S and are combined with the results of a preceding surface data estimate of transport divergence for the area poleward of 70°S. The estimates based on atmospheric and surface data show remarkable agreement (the difference is well within the error estimates. (Auth. mod.)

**I-57546**

Lynch, D.K., **Cirrus clouds: their role in climate and global change**, *Acta astronautica*, June 1996, 38(11), p.859-863, 31 refs.

Cirrus clouds are high, cold clouds composed of asymmetric ice particles. Along with low marine stratus, they are the principal cloud type controlling the Earth's radiation budget. Thin cirrus clouds cause a net heating of the Earth because they allow visible sunlight to pass almost unhindered while at the same time absorbing and reradiating infrared radiation from the surface below. Cirrus clouds are also far more widespread than previously believed. Cirrus cloud climatologies have been examined based on ground observations, limb scanning, and down-looking satellite sensors. The global frequency of occurrence for cirrus clouds over land is between 28 and 42%. The zonal average frequency of occurrence for cirrus clouds varies from 7 to 61%. These values vary depending on geographic location and season, with some locations having persistent cirrus coverage while others have infrequent coverage. Although clearly evident trends are present in the geographical cirrus occurrence, month-to-month and year-to-year variations are so large that the statistics can only be used for the probabilistic assessments, not predictive purposes. In this paper the author surveys cirrus clouds and their radiative properties in terms of climate feedback, discusses multispectral cirrus cloud observations and reviews the latest satellite cloud climatologies. The area surveyed extended to approximately 70N and 70S with full global inclusions, longitudinally. (Auth. mod.)

**I-57551**

Parish, T.R., Wang, Y.H., Bromwich, D.H., **Forcing of the austral autumn surface pressure change over the antarctic continent**, *Journal of the atmospheric sciences*, June 1, 1997, 54(11), p.1410-1422, 28 refs.

Pronounced seasonal variations in the surface pressure field are present over the antarctic continent. Surface pressures over the ice sheet decrease during the austral autumn period Jan.-Apr. and increase during the austral springtime months Sep.-Dec. The largest changes are found over the highest portions of the antarctic ice sheets where seasonal surface pressure changes of up to 20 hPa are common. The outstanding feature of these surface pressure changes is that typically the isallobaric contours closely follow the antarctic orography during both transition periods, suggesting a strong seasonal diabatic adjustment within the lower troposphere. During austral autumn, the pronounced cooling of the lower atmosphere adjacent to the ice sheets leads to an enhancement of the antarctic katabatic wind regime and hence the lower branch of the mean meridional circulation over the high southern latitudes. The mass transport provided by these drainage flows is proposed as the mechanism behind the autumn pressure falls. Numerical simulations of the evolution of the antarctic katabatic wind regime indicate that the radiative cooling of the sloping ice fields and attendant mass transport result in a modification of the temperature and pressure fields in the lower troposphere similar to what is seen during the early austral autumn period. (Auth.)

**I-57552**

Davis, A.M.J., McNider, R.T., **Development of antarctic katabatic winds and implications for the coastal ocean**, *Jour-*

*nal of the atmospheric sciences*, May 1, 1997, 54(9), p.1248-1261, 19 refs.

The influence of katabatic winds on the antarctic coastal waters is examined by using simple models of the ocean and atmosphere. A katabatic flow model incorporating Coriolis dynamics is solved analytically and another with nonlinear friction is solved numerically to provide wind stress to a two-layer coastal ocean model. The resulting solutions are evidently the first to incorporate Coriolis terms with a thermodynamic equation that includes compressional warming effects. The emphasis in this paper is on delineating the parameters that control the relative adjustment of the katabatic wind into alongshore and offshore components. The ocean model shows that significant downwelling occurs at the coast, while upwelling is predicted at a distance of the order of the ocean Rossby radius. An alongshore coastal jet from the east is found in the model and is evidently the manifestation of the east wind drift. The upwelling offshore may be a significant aspect of polynya formation and maintenance of the antarctic divergence zone and contributes to the biological productivity of the region. (Auth. mod.)

**I-57558**

Hoffmann, J.A.J., Núñez, S.E., Vargas, W.M., **Temperature, humidity and precipitation variations in Argentina and the adjacent sub-antarctic region during the present century**, *Meteorologische Zeitschrift*, Feb. 1997, 6(1), p.3-11, With German summary. 12 refs.

The problem regarding a possible warming in Argentina and in the adjacent subantarctic region has been studied within the framework of the global warming issue and taking into account the evolution of the global mean surface temperature since 1880. The decadal averages of the annual means of the maximum, minimum and daily mean temperature, the vapor pressure and the precipitation corresponding to the periods of 1941-1950 and 1981-1990 have been compared for representative meteorological stations. The results of these studies indicate a significant warming in southern Patagonia and South Orkney Is. since the forties or earlier, with the augmentation of each of three temperature parameters being larger than 1°C. North of about 42°S, however, no warming has been observed. As to the subantarctic region in particular, the augmentation of the precipitation observed at Orcadas Station may be partially associated with the general warming in that region. (Auth. mod.)

**I-57559**

Vincent, R.A., Allen, S.J., Eckermann, S.D., **Gravity-wave parameters in the lower stratosphere**, NATO Advanced Research Workshop on Gravity Wave Processes and Their Parameterization in Global Climate Models, Santa Fe, NM, Apr. 1-5, 1996. Proceedings and NATO Advanced Science Institutes, Series I. Global Environmental Change. Vol.50, Berlin, Springer-Verlag, 1997, p.7-25, 36 refs.

**DLC QC851.G64**

Observations made in the lower stratosphere with high-resolution radiosondes launched from Macquarie I. are used to study parameters important in gravity-wave parameterization schemes. The combination of horizontal wind and temperature data allow wave amplitudes and directions of horizontal propagation to be determined. Significant enhancements in wave energy are found to occur near the inertial frequency and there is appreciable directional anisotropy, especially in winter. Estimates of vertical fluxes of horizontal momentum are made from the covariances between the wind and temperature perturbations. (Auth.)

**I-57571**

Argentini, S., Del Buono, P., Grigioni, P., Della Vedova, A.M., **Potential temperature behavior on Nansen Ice Sheet Antarctica, during year 1989**, *ENEA, Istituto di Fisica Atmosferica*, Dec. 1995, RT-AMB-95-20, 15p., DE97-713415, With Italian summary. 4 refs.

The variability of the wind profile and atmospheric height and thermal structure in Terra Nova Bay were studied. The data collected by a network of Automatic Weather Stations (AWS) and by a sodar system during the summer '88-'89 are analyzed. To study the flow of Reeves and Priestley Glaciers and episodes in which the two flows are presented separately on the Nansen Ice Sheet, the difference of weekly mean potential temperature between the AWS 8909 and AWS 7352 for the year 1989—and the differ-



ences of daily mean potential temperature for all months—have been computed. Cases of anomalous stratification, in which the air masses from the Priestley Glacier are older than those of the Reeves Glacier, were found. To explain these superimpositions, sodar wind profiles and the potential temperatures of the AWSs 8909, 7352, 8931, and 8905 have been compared, hour by hour, for the 8th and 9th of Jan. During these hours, a katabatic wind episode is recorded. (Auth.)

**I-57576**

Peter, T., **Formation mechanisms of polar stratospheric clouds**, International Conference on Nucleation and Atmospheric Aerosols, 14th, Helsinki, Finland, Aug.26-30, 1996. Proceedings. Edited by M. Kulmala et al, Oxford, Elsevier Science Ltd., 1996, p.280-291, Refs.p.289-291.

**DLC QC921.6.C6 N83**

This paper summarizes the current state of knowledge of the microphysics and heterogeneous chemistry of polar stratospheric clouds with emphasis on liquid and solid particle thermodynamics and on kinetics of non-reactive gas uptake leading to particle growth. The consequences of the present uncertainties for the chemical processing of stratospheric air are briefly discussed. (Auth. mod.)

**I-57577**

Tolbert, M.A., Disselkamp, R.S., Tisdale, R.T., Prenni, A.J., Onasch, T., **Crystallization kinetics of nitric acid dihydrate aerosols: implications for polar stratospheric clouds**, International Conference on Nucleation and Atmospheric Aerosols, 14th, Helsinki, Finland, Aug.26-30, 1996. Proceedings. Edited by M. Kulmala et al, Oxford, Elsevier Science Ltd., 1996, p.315-317, 11 refs.

**DLC QC921.6.C6 N83**

Type Ia polar stratospheric clouds are thought to consist of  $\text{HNO}_3/\text{H}_2\text{O}$  mixtures, usually assumed to be crystalline nitric acid trihydrate (NAT) or nitric acid dihydrate (NAD). The authors studied the crystallization of supercooled aerosols to determine the activation parameters used in homogeneous nucleation calculations. They found that the interfacial surface energy for NAD nucleation is much lower than the corresponding surface energy for NAT, suggesting a possible role for NAD in type Ia PSC formation. (Auth. mod.)

**I-57578**

Koop, T., Luo, B.P., Biermann, U.M., Peter, T., **Freezing of binary and ternary solutions of  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$  and  $\text{H}_2\text{O}$  under stratospheric conditions: nucleation statistics and experiments**, International Conference on Nucleation and Atmospheric Aerosols, 14th, Helsinki, Finland, Aug.26-30, 1996. Proceedings. Edited by M. Kulmala et al, Oxford, Elsevier Science Ltd., 1996, p.318-321, 8 refs.

**DLC QC921.6.C6 N83**

New calorimetric freezing experiments of binary and ternary  $\text{H}_2\text{SO}_4/\text{HNO}_3/\text{H}_2\text{O}$  solutions are presented with applications to the formation of polar stratospheric clouds (PSCs). The authors show that the nucleation of hydrates from these solutions is a stochastic process and nucleation rates can be determined using Poisson statistics. The experiments reveal that under stratospheric conditions the freezing process of aerosol droplets is limited by the nucleation rates of the hydrates, rather than their crystal growth rates. Under thermodynamic equilibrium conditions above the ice frost point the homogeneous nucleation rates of stratospheric aerosols are exceedingly low, ruling out homogeneous freezing as a pathway for PSC formation. (Auth. mod.)

**I-57579**

Ohtake, T., **Ice nucleation on sulfuric acid particles**, International Conference on Nucleation and Atmospheric Aerosols, 14th, Helsinki, Finland, Aug.26-30, 1996. Proceedings. Edited by M. Kulmala et al, Oxford, Elsevier Science Ltd., 1996, p.353-356, 16 refs.

**DLC QC921.6.C6 N83**

Based on measurements of ice-nucleus concentration at Amundsen-Scott Station, below  $-30^\circ\text{C}$  with precisely controlled humidities, hygroscopic particles were converted to ice crystals below sub-water saturation environment. Ice-crystal nucleation on sublimation nuclei has been ruled out in Fairbanks ice fog, and in diamond-dust crystals formed over polar zones. Hygroscopic aerosol particles have been identified as sulfuric acid, which are originated from ocean sources, manmade air pollution and volcanic activities. Sulfuric acid particles will form minute water droplets which freeze into ice crystals at the freezing temperatures that vary depending upon the aqueous sulfuric acid solution concentrations. These minute sulfuric acid particles must be responsible for formation on cirrus cloud crystals and even the polar stratospheric cloud particles. (Auth. mod.)

**I-57580**

Kikuchi, K., Harada, M., Uyeda, H., **Nucleation characteristics of polycrystalline ice crystals**, International Conference on Nucleation and Atmospheric Aerosols, 14th, Helsinki, Finland, Aug.26-30, 1996. Proceedings. Edited by M. Kulmala et al, Oxford, Elsevier Science Ltd., 1996, p.361-364, 14 refs.

**DLC QC921.6.C6 N83**

Polycrystalline ice crystals which were microphotographed by the authors in arctic and antarctic regions were classified into 12 types. Almost all of them were crossed plates type and their production rate was approximately less than 5% of usual ice crystals. To investigate the shapes of these ice crystals and their production rate, laboratory experiments using a cloud chamber were carried out under temperature conditions between  $-18$  and  $-42^\circ\text{C}$ . As a result, almost all shapes that were observed in the polar regions occurred in the chamber and their rate was less than 5%, a value similar to that of an observational result. (Auth. mod.)

**I-57581**

Jaenicke, R., Dreiling, V., **Time series of the condensation nuclei concentration at the German Neumayer-Station in Antarctica since 1982**, International Conference on Nucleation and Atmospheric Aerosols, 14th, Helsinki, Finland, Aug.26-30, 1996. Proceedings. Edited by M. Kulmala et al, Oxford, Elsevier Science Ltd., 1996, p.435-438, 9 refs.

**DLC QC921.6.C6 N83**

Since the antarctic summer 1981-82, measurements of the atmospheric condensation nuclei (CN) concentration have been performed at Georg von Neumayer Station. The data in Antarctica show a pronounced seasonality with the minimum in winter and a maximum in summer time. The new evaluation for the period 1990 to 1994 again shows an increase. (Auth. mod.)

**I-57582**

DeFelice, T.P., **On the variation of cloud condensation nuclei spectra at Palmer Station, Antarctica**, International Conference on Nucleation and Atmospheric Aerosols, 14th, Helsinki, Finland, Aug.26-30, 1996. Proceedings. Edited by M. Kulmala et al, Oxford, Elsevier Science Ltd., 1996, p.828-831, 17 refs.

**DLC QC921.6.C6 N83**

Cloud Condensation Nuclei (CCN) activity spectra and meteorological data were measured between Feb. 12 and Feb. 26, 1994 at Palmer Station. The CCN spectra were typical of a marine location. The meteorological and CCN spectral data indicate a significant change in the total CCN concentration measured in association with the sampling near the fog-free boundary of different air-masses or air-parcels, including those from evaporating clouds. These measurements show that the temporal variation of CCN spectra may be used to obtain information concerning air-mass transport and mixing without making the measurements within cloudy air. (Auth.)

**I-57604**

Howard, W.R., **Warm future in the past**, *Nature*, July 31, 1997, 388(6641), p.418-419, 12 refs.

The author provides a brief examination of discussions held at the symposium "Carbonate Marine System During Oxygen Isotope Stage 11," during the American Geophysical Union Spring Meeting, Baltimore, MD, USA, 27-30 May 1997. As to the questions are we entering an extended



warming period or a short period of warmth followed by a return to glacial conditions, there appeared to be nearly equal amounts of evidence supporting each possibility.

#### I-57612

King, J.C., Connolley, W.M., **Validation of the surface energy balance over the antarctic ice sheets in the U.K. Meteorological Office Unified Climate Model**, *Journal of climate*, June 1997, 10(6), p.1273-1287, 41 refs.

Surface radiation measurements and other climatological data were used to validate the representation of the surface energy balance over the East Antarctic Ice Sheet. Model calculations of incident and reflected shortwave radiation are in good agreement with observations, but the downward component of longwave radiation at the surface appears to be underestimated by up to 20 W/m<sup>2</sup> in the model. Over much of the interior of Antarctica this error appears to be compensated for by an overestimate in turbulent transport of heat to the surface, while over the steep coastal slopes the heat flux is in good agreement with observations but the surface temperature is too low. The excessive heat flux over the interior results largely from the use of an inappropriately large bulk transfer coefficient under very stable conditions, suggesting that the surface heat flux scheme in the model is not ideally formulated for the conditions that prevail in the antarctic boundary layer. (Auth. mod.)

#### I-57625

Marshall, G.J., Turner, J., **Katabatic wind propagation over the western Ross Sea observed using ERS-1 scatterometer data**, *Antarctic science*, June 1997, 9(2), p.221-226, 26 refs.

Wind fields derived from ERS-1 scatterometer data, acquired over the open water present in the western Ross Sea during the summer season, are used to study the patterns of mesoscale atmospheric flow connected with surges of katabatic air from the Terra Nova Bay convergence zone. These katabatic winds may turn northward or southward, or divide into separate northward- and southward-turning components. Analysis of concurrent AWS data suggests that the most likely mechanism for the observed southward turning is the existence of a highly-localized low pressure center south of Terra Nova Bay. Results demonstrate that the satellite data are able to correctly portray changes in mesoscale circulation patterns, and are suitable for the routine monitoring of winds over open water around the antarctic coastline. (Auth.)

#### I-57637

Andreas, E.L., Treviño, G., **Using wavelets to detect trends**, *Journal of atmospheric and oceanic technology*, June 1997, 14(3)pt.1, p.555-564, 26 refs.

Wavelets are a new class of basis functions that are finding wide use for analyzing and interpreting time series data. This paper describes a new use for wavelets—identifying trends in time series. The general signal considered has a quadratic trend. The inverted Haar wavelet and the elephant wavelet, respectively, provide estimates of the first-order and second-order coefficients in the trend polynomial. This paper demonstrates wavelet trend detection using artificial data and then various turbulence data collected in the atmospheric surface layer, and last, provides guidelines on when linear and quadratic trends are “significant” enough to require removal from a time series. Anemometer data from Weddell Station, Antarctica is used in the analysis. (Auth. mod.)

#### I-57673

Kong, Q.X., Liu, G.G., Wang, G.C., **Observations and analyses of atmospheric ozone over antarctic Zhongshan Station in the spring of 1993**, *Chinese journal of atmospheric sciences*, 1996, 20(3), p.302-308, 9 refs.

Electrochemical ozonesondes were used to measure the vertical profile of ozone and temperature over Zhongshan Station in the spring of 1993. The authors observed the total ozone of less than 220 Du three times. The reduction of ozone concentration began in Sep., reaching maximum from mid-Sep. to mid-Oct. The typical vertical distribution of the ozone indicates that 13-23 km above the surface is the largest range of ozone loss. This is the height range where the polar stratospheric clouds and volcanic aerosols exist. This paper presents observational results and fundamental analyses. (Auth. mod.)

#### I-57681

Heinemann, G., **Polar mesocyclones** [Polare Mesozyklonen], *Bonner meteorologische Abhandlungen*, 1995, Vol.45, 156p., In German with English summary. Refs. p.147-156.

**DLC QC851.B64 Heft 45**

Meso-scale cyclones with small spatial and temporal scales occur poleward of the main polar front. These “polar mesocyclones” or “polar lows” may have a large impact on local weather conditions and may be of vital importance for human activities in polar regions. The main concern of the present study is to contribute to the understanding of the development and the structures of polar mesocyclones. The point of main effort lies on investigations of mesocyclones in the Weddell Sea area. Results from studies for different regions in the Antarctic and in the Arctic are compared to the results of the present study in relation to the entirety of polar mesocyclones in both hemispheres. Insights into the complex processes for the development of these mesocyclones were obtained by climatological studies during the antarctic summer and winter and by the aircraft-based experiment AMES during the austral summer 1989-90. (Auth. mod.)

#### I-57691

Appenzeller, C., Holton, J.R., **Tracer lamination of the stratosphere: a global climatology**, *Journal of geophysical research*, June 27, 1997, 102(D12), p.13,555-13,569, 39 refs.

Vertical soundings of stratospheric ozone often exhibit laminated tracer structures characterized by strong vertical tracer gradients. The change in time of these gradients is used to define a tracer lamination rate. It is shown that this quantity can be calculated by the cross product of the horizontal temperature and horizontal tracer gradients. A climatology based on satellite-borne ozone data and on ozone-like pseudotracer data is presented. Three stratospheric regions with high lamination rates were found: the part of the stratospheric overworld which is influenced by the polar vortex, the part of the lowermost stratosphere which is influenced by the tropopause and a third region in the subtropical lower stratosphere mainly characterized with strong vertical shear. During winter, high lamination rates associated with the stratospheric polar vortex are present down to ca. 100 hPa. The patterns in the southern and northern hemisphere are comparable, but details differ as anticipated from a less disturbed and more symmetric antarctic vortex. (Auth. mod.)

#### I-57692

Krinner, G., Genthon, C., Li, Z.X., Le Van, P., **Studies of the antarctic climate with a stretched-grid general circulation model**, *Journal of geophysical research*, June 27, 1997, 102(D12), p.13,731-13,745, 50 refs.

A stretched-grid general circulation model is used for a multiyear high-resolution simulation of the antarctic climate. The resolution in the antarctic region reaches 100 km. The simulated antarctic climate is significantly better in the stretched-grid simulation than in the regular-grid control run. The katabatic wind regime is well captured, although the winds may be too weak. The annual snow accumulation is close to the observed values. The model correctly simulates the atmospheric dynamics of the rest of the globe. (Auth. mod.)

#### I-57693

Hines, K.M., Bromwich, D.H., Liu, Z., **Combined global climate model and mesoscale model simulations of antarctic climate**, *Journal of geophysical research*, June 27, 1997, 102(D12), p.13,747-13,760, 35 refs.

Simulations of antarctic latitudes with a high-resolution mesoscale model examine the impact of a moist physics parameterization and the success of a one-way nesting inside a global climate model. The nested simulation is sensitive to the forcing at the horizontal boundaries. Consequently, proper location of troughs and ridges at the boundaries is required for the model to well represent all the major troughs and ridges inside the domain. The addition of moist physics to the mesoscale simulations tends to improve the quality of the simulated fields over the southern ocean. In particular, the intensity of the circumpolar trough is increased. Over Antarctica, serious deficiencies are found in the simulations with moist physics. Excessive moisture is apparently stored in the simulated clouds



leading to excessive atmospheric back radiation and, consequently, excessive temperatures at the surface and higher up in the troposphere. (Auth. mod.)

#### I-57694

Cullather, R.I., Bromwich, D.H., Grumbine, R.W., **Validation of operational numerical analyses in antarctic latitudes**, *Journal of geophysical research*, June 27, 1997, 102(D12), p.13,761-13,784, 43 refs.

Available rawinsonde, automatic weather station (AWS), ship, and synthesized long-term observations are used to evaluate the antarctic numerical analyses of the European Centre for Medium-Range Weather Forecasts (ECMWF) and the U.S. National Centers for Environmental Prediction (NCEP) from 1985 to 1994. Twice-daily variations in the ECMWF surface pressure analyses compare closely with AWS units of the U.S. Antarctic Program and ship observations. The NCEP analyses over the same period show substantial improvement, particularly during the period 1985-1990. Surface air temperatures and winds do not agree so closely, which may result from analyses error, the localized nature of the fields, or a combination. Results presented here indicate that a large amount of the available data is being incorporated and that large deficiencies identified in previous studies are being addressed, although areas of concern remain. In particular, grid values corresponding to individual stations including the now-closed Leningradskaya base and Mirnyy are found to be conspicuously deficient at the 200 hPa level for both analyses. (Auth. mod.)

#### I-57695

Parish, T.R., Bromwich, D.H., **On the forcing of seasonal changes in surface pressure over Antarctica**, *Journal of geophysical research*, June 27, 1997, 102(D12), p.13,785-13,792, 32 refs.

A 10-year record (1985-1994) of output statistics from the European Centre for Medium-Range Weather Forecasts model shows that profound seasonal changes in surface pressure take place over the antarctic continent. The large seasonal changes in solar insolation reaching the antarctic ice surface modulate the intensity of the katabatic wind regime and thus the resulting mean meridional circulation between the continent and the subpolar latitudes. It is proposed that the diabatic adjustment in the lower levels of the atmosphere over Antarctica disrupts the mean meridional circulation creating a seasonal mass imbalance and hence surface pressure changes. The seasonal mass movement over Antarctica requires large-scale mass compensation over much of the Southern Hemisphere and shows that the diabatic influences at the antarctic surface have far-field impacts. (Auth. mod.)

#### I-57696

Heinemann, G., **Idealized simulations of the antarctic katabatic wind system with a three-dimensional mesoscale model**, *Journal of geophysical research*, June 27, 1997, 102(D12), p.13,825-13,834, 23 refs.

The katabatic wind system represents a key factor for the near-surface wind field of the antarctic region. Idealized simulations with a three-dimensional mesoscale model are performed to investigate the development of the antarctic katabatic wind system and its sensitivity to physical boundary conditions, in particular channeling effects and the thermodynamic forcing close to the coastline. The simulated cases represent winter-time cases with complete sea ice coverage and no sea ice, as well as a realistic summertime situation. The formation of shallow mesoscale circulations is simulated after 2-4 days of simulation in ice-free coastal areas. In these regions, low-level convergence, diabatic heating, and the cold air advection associated with the katabatic flow leads to low-level baroclinicity and cyclonic vorticity production. (Auth. mod.)

#### I-57697

Gallée, H., **Air-sea interactions over Terra Nova Bay during winter: simulation with a coupled atmosphere-polynya model**, *Journal of geophysical research*, June 27, 1997, 102(D12), p.13,835-13,849, Refs. p.13,848-13,849.

A preliminary simulation of the Terra Nova Bay polynya has been performed with a coupled atmosphere-polynya model. The atmospheric model is a hydrostatic primitive equations model that has been validated

previously by a simulation of the strong katabatic winds observed in that area. The polynya model includes a representation of the free drift of frazil ice and simple sea-ice dynamics and thermodynamics. Two-dimensional experiments show that an open (warm) water area influences significantly the atmospheric circulation in the antarctic coastal zone: an additional ice-breeze effect is simulated and is responsible for the strengthening of the katabatic winds near the coast. Because of the important temperature difference between the continental air and the ice-free ocean (up to 40°C), strong surface heat fluxes are simulated over the polynya. Finally, a three-dimensional experiment has been performed. The integration domain includes Terra Nova Bay. The polynyas observed are stronger than previously thought but are probably constrained by the idealized representation of frazil ice, which is assumed to be uniform in each grid box. (Auth. mod.)

#### I-57698

Carleton, A.M., Song, Y.D., **Synoptic climatology, and intra-hemispheric associations, of cold air mesocyclones in the Australasian sector**, *Journal of geophysical research*, June 27, 1997, 102(D12), p.13,873-13,887, 43 refs.

Satellite thermal infrared images for 7 months in 1992 are interpreted for cold air mesoscale cyclones (mesocyclones) occurring in the Australasian sector of the southern ocean. Time-averaged (monthly, seasonal) distributions of mesocyclogenesis, mesocycloysis, and tracks of movement, along with statistical and summaries of mesocyclone attributes are presented and discussed in the context of the larger-scale atmospheric circulation. The associations of mesocyclone "outbreaks" with composite anomaly fields of pressure and height are identified for 3 subareas of the Australasian sector suggested by the analysis of mesocyclone spatial patterns. When outbreaks occurred in the New Zealand subarea in 1992, a similarly strong couplet of pressure/height anomalies developed in the southern South America/Antarctic Peninsula sector but not when outbreaks occurred south of Australia. Long distance associations of mesocyclone outbreaks are consistent with the connectivity of the baroclinic waves and might prove useful in the development of techniques to forecast mesocyclones over the southern ocean. (Auth. mod.)

#### I-57699

McMurdie, L.A., Claud, C., Atakturk, S., **Satellite-derived atmospheric characteristics of spiral and comma-shaped southern hemisphere mesocyclones**, *Journal of geophysical research*, June 27, 1997, 102(D12), p.13,889-13,905, 46 refs.

Mesoscale cyclones in cold airstreams poleward of major frontal zones are generated frequently over the southern ocean. Quantitative information regarding the atmospheric water and wind fields of these systems can be retrieved from satellite-borne microwave instruments. This study summarizes the structures found in the SSM/I-derived integrated water vapor (IWV), cloud liquid water, wind speed, and liquid and solid precipitation fields for 33 southern ocean mesolows. This study confirms earlier results and also examines several features not previously investigated in southern ocean mesolows. Surface fluxes of heat and moisture were estimated from European Centre for Medium-Range Weather Forecasting gridded fields for two cases and found to be moderate during the formation of the mesolow that occurred near the antarctic ice edge and low for a comma cloud case. In addition, TOVS-derived thickness patterns show that the antarctic case lacked strong baroclinic structure, whereas comma cloud cases tend to develop in baroclinic environments. (Auth. mod.)

#### I-57700

Marshall, G.J., Turner, J., **Surface wind fields of antarctic mesocyclones derived from ERS 1 scatterometer data**, *Journal of geophysical research*, June 27, 1997, 102(D12), p.13,907-13,921, 49 refs.

The effectiveness of ERS 1 scatterometer data as a tool for studying the wind fields of antarctic mesocyclones is analyzed by using 1 year's observations of these systems derived from satellite imagery encompassing the Antarctic Peninsula and Bellingshausen and Weddell Seas. It is shown that the scatterometer processing scheme utilized can affect the resultant wind fields, particularly the accuracy of the external forecast winds used for "meteorological ambiguity removal." Very few of the mesocyclones (9%) were "captured" by the scatterometer data because ca. 60% of the vortices did not form over the open ocean, and because the nar-



row scatterometer swath results in a poor temporal resolution unfit for the small-sized, short-lived antarctic mesocyclones. The scatterometer wind field data represent an important new tool for studying antarctic mesocyclones but need to be used in conjunction with sensors having a higher frequency of coverage to allow multitemporal analyses of such systems throughout their development. (Auth. mod.)

#### I-57701

Carrasco, J.F., Bromwich, D.H., Liu, Z., **Mesoscale cyclone activity over Antarctica during 1991. 1. Marie Byrd Land**, *Journal of geophysical research*, June 27, 1997, 102(D12), p.13,923-13,937, 33 refs.

A 1-year statistical study of mesoscale cyclonic activity indicates that, on average, one or two mesoscale cyclones can be observed each week over the southernmost part of Marie Byrd Land, where cold katabatic winds from the high plateau of East Antarctica and relatively warm katabatic airflows from West Antarctica interact. The 1991 annual mesoscale cyclone behavior exhibits maximum activity in Mar. and minimum in Sep. Analysis of the large-scale pattern for these months suggests that the higher activity in Mar. is associated with synoptic-scale conditions that support the cold katabatic drainage from East Antarctica and favor warm air advection into West Antarctica. More than half (70%) of the mesoscale vortices observed near Siple Coast were of comma cloud type with an average diameter of about 250 km. The satellite signature characteristics show that these cyclonic perturbations were stratiform low cloud features, indicating that most developed within the lower troposphere. (Auth. mod.)

#### I-57702

Carrasco, J.F., Bromwich, D.H., Liu, Z., **Mesoscale cyclone activity over Antarctica during 1991. 2. Near the Antarctic Peninsula**, *Journal of geophysical research*, June 27, 1997, 102(D12), p.13,939-13,954, 33 refs.

In a survey of mesoscale cyclogenesis near the Antarctic Peninsula carried out for 1991, a slightly higher cyclonic activity was found over the Bellingshausen Sea than over the Weddell Sea. Both sides were characterized by a pronounced formation maximum in summer and a minimum in winter. Comma clouds were the dominant vortex type. The fraction of mesoscale cyclones with middle and/or high cloud on the west side of the Antarctic Peninsula was much higher than on the east side. These numerous and deep mesoscale cyclones are a consequence of the frequent outbreaks of cold air associated with synoptic-scale cyclones that move cold air northward over the relatively warm Bellingshausen Sea. This happens less often in the Weddell Sea area, where low-level baroclinic instability and vortex stretching are the dominant formation mechanisms, and air-sea interaction is usually much less vigorous. (Auth. mod.)

#### I-57703

Turner, J., Colwell, S.R., Harangozo, S., **Variability of precipitation over the coastal western Antarctic Peninsula from synoptic observations**, *Journal of geophysical research*, June 27, 1997, 102(D12), p.13,999-14,007, 23 refs.

Observations of precipitation events at Faraday and Rothera Stations are analyzed to investigate the spatial and temporal variability of precipitation along the western coastal (Pacific) side of the Antarctic Peninsula. The record of observations made at Faraday since 1956 shows a statistically significant increase in the number of winter-season precipitation events. The semiannual cycle in the latitudinal location and depth and position of the circumpolar trough is reproduced in the record of precipitation events at both Faraday and Rothera. It is argued that the systematic increase in the number of precipitation events at Faraday since the 1950s is associated with changes in the depression tracks across the Bellingshausen Sea, with an increase in the number of depressions approaching from outside the Antarctic rather than from the west. (Auth. mod.)

#### I-57704

Hogan, A.W., **Synthesis of warm air advection to the South Polar Plateau**, *Journal of geophysical research*, June 27, 1997, 102(D12), p.14,009-14,020, 47 refs.

Surface temperature and wind chronologies of varying length and 10 m snow temperatures have been used to produce a synthesis of airflow into Antarctica. This synthesis shows relatively warm air over Ellsworth Land, which appears to enter the South Polar Plateau through a slightly lower-

lying trough between the summit of the Transantarctic Mountains and the Polar Plateau. Comparison of recent automatic weather station (AWS) records from Mount Howe with four AWS surrounding South Pole at 89°S show that this upslope inflow is a frequent and persistent phenomenon. (Auth.)

#### I-57714

Bugaeva, I.V., Butko, A.I., Tarasenko, D.A., **Wave processes and ozone over the Antarctic** [Volnovye protsessy i ozon nad Antarktikoi], *Antarktika*, 1995, No.33, p.5-14, In Russian with English summary. 11 refs.

Data on total ozone over the Antarctic in spring of 1991 are presented. The data are compared to specific features of the thermodynamic parameters of the atmosphere obtained using meteorological rockets and satellites. Wave processes in the spring of 1991 are analyzed. Deviations of the zonal wave-numbers  $n=1$  and  $n=2$  from the model values are demonstrated. The authors conclude that the position and intensity of the polar vortex play a significant role in interannual variations in the ozone layer observed over Antarctica. (Auth. mod.)

#### I-57715

Kidiiarova, V.G., Fomina, N.N., **Evaluation of the role of dynamic interactions between the lower and middle atmospheres in stratospheric and mesospheric temperatures and circulation variations over Molodezhnaya Station during the 1982-1990 winter and spring seasons** [Otsenka roli dinamicheskogo vzaimodeistviia mezhdu nizhnei i srednei atmosferoi v izmeneniiakh temperatury i tsirkulatsii v stratosfere i mezofere nad st. Molodezhnaia v zimnie i vesennie sezony 1982-1990 gg.], *Antarktika*, 1995, No.33, p.15-18, In Russian with English summary. 5 refs.

On the basis of winter and spring rocket observation data over Molodezhnaya Station for 1982-1990, the connections between temperatures and zonal wind variations for different layers of the stratosphere and mesosphere are evaluated. The propagation of planetary waves and energy exchanges between the layers are also investigated. Refraction coefficient calculations are used to analyze the conditions for planetary wave propagation. The authors show that when westward circulation is highly intense, energy from planetary waves is transferred to the antarctic stratosphere and/or mesosphere causing a corresponding warming of these regions of the atmosphere. (Auth. mod.)

#### I-57760

Shindell, D.T., **Potential influence of ClO·O<sub>2</sub> on stratospheric ozone depletion chemistry**, *Journal of atmospheric chemistry*, Mar. 1997, 26(3), p.323-335, 24 refs.

The author examines the implications of proposed ClO·O<sub>2</sub> chemistry, calculating the abundance of ClO·O<sub>2</sub> in equilibrium with typical measured values of enhanced ClO within the antarctic polar vortex. A stable ClO·O<sub>2</sub> compound creates a significant chlorine reservoir, while fairly rapid dimer formation greatly increases the [Cl<sub>2</sub>O<sub>2</sub>]/[ClO] ratio. It is shown that one or both of the steps whereby ClO forms Cl<sub>2</sub>O<sub>2</sub> via ClO·O<sub>2</sub> must proceed fairly slowly. Ozone depletion rates are then calculated based on these constraints. (Auth. mod.)

#### I-57767

Genthon, C., Jouzel, J., Déqué, M., **Accumulation at the surface of polar ice sheets: observation and modelling for global climate change**, NATO Advance Research Workshop on Global Precipitations and Climate Change, l'Agelonde, France, Sep. 27-Oct. 1, 1993. Proceedings. Edited by M. Debois et al and NATO ASI, Series I. Global Environmental Change. Vol.26, Berlin, Springer-Verlag, 1994, p.53-75, Refs. p.71-75.

#### DLC QC925.G56

Precipitation change over Greenland or Antarctica might have truly global environmental impact because it can affect the balance of water between the ocean and the ice sheets, and therefore the global sea level. General Circulation Models (GCMs) of the atmosphere are popular tools to study the components of a climate change. Yet they are not altogether successful in the polar regions. Models spatial resolution is one important limitation of models performances, particularly at regional scales. This



paper shows how going from rather coarse to very fine resolution helps improve the simulation of net annual mean accumulation (precipitation minus evaporation/sublimation) at the surface of Greenland and Antarctica in the Météo-France Arpège GCM. (Auth. mod.)

### I-57768

Harangozo, S.A., **Atmospheric meridional circulation impacts on contrasting winter sea ice extent in two years in the Pacific sector of the southern ocean**, *Tellus*, May 1997, 49A(3), p.388-400, 27 refs.

An explanation is sought for the marked variation in maximum sea ice extent observed between 2 years in the 2 areas of greatest interannual variability in winter ice extent in the South Pacific sector of the southern ocean surrounding Antarctica. The role of ice recession in controlling ice extent is highlighted, and the adjustments in the near-surface atmospheric meridional circulation and air temperature that attend winter periods of ice retreat and advance are noted. Systematic meridional circulation changes also take place during the development and over the duration of ice extent anomalies. These are shown to emanate from adjustments of the semi-annual cycle in the extra-tropical South Pacific atmospheric circulation. (Auth. mod.)

### I-57773

Rind, D., Healy, R., Parkinson, C., Martinson, D., **Role of sea ice in 2XCO<sub>2</sub> climate model sensitivity: part II: hemispheric dependencies**, *Geophysical research letters*, June 15, 1997, 24(12), p.1491-1494, 5 refs.

The sensitivity of doubled CO<sub>2</sub> simulations to GCM control-run sea ice thickness and extent is examined in a series of 10 control-run simulations with different sea ice and corresponding doubled CO<sub>2</sub> simulations. Results show that with increased control-run sea ice coverage in the Southern Hemisphere, temperature sensitivity with climate change is enhanced, while there is little effect on temperature sensitivity of (reasonable) variations in control-run sea ice thickness. Overall, the Southern Hemisphere sea ice coverage change had a large impact on global temperature, because Northern Hemisphere sea ice was sufficiently thick to limit its response to doubled CO<sub>2</sub>, and sea ice changes generally occurred at higher latitudes, reducing the sea ice-albedo feedback. In both these experiments the model displayed a sensitivity of ca. 0.02°C global warming per percent change in Southern Hemisphere sea ice coverage. (Auth. mod.)

### I-57774

Parker, D.E., Gordon, M., Cullum, D.P.N., Sexton, D.M.H., Foland, C.K., Rayner, N., **New global gridded radiosonde temperature data base and recent temperature trends**, *Geophysical research letters*, June 15, 1997, 24(12), p.1499-1502, 22 refs.

The authors present a new analysis of global radiosonde temperature data. From 1979 onwards, the data from the Australasian region have been corrected for instrument-related discontinuities with the help of comparisons with collocated retrievals from satellite-based Microwave Sounding Units. Latitude-height profiles or zonal-mean temperature changes since the 1960s show significant cooling in the lower stratosphere, especially in middle and high latitudes of the Southern Hemisphere, but the cooling over Australasia is less than shown by unadjusted data. Warming dominates the troposphere but is not a maximum in the tropical upper troposphere. In the annual mean, tropospheric warming is greatest around 45°N and possibly in the data-sparse high latitudes over Antarctica. (Auth. mod.)

### I-57787

Varley, M.J., **Use of kites to investigate boundary layer meteorology**, *Meteorological applications*, June 1997, 4(2), p.151-159, 16 refs.

The application of kites as a platform for meteorological measurement within the boundary layer is examined. Kites are shown to fulfil a useful role within this research area, particularly when a highly mobile, lightweight and inexpensive instrumental platform is required. They are ideal for use at remote sites, or sites where terrain limits access for more conventional profiling equipment. Appropriate kite selection for given wind conditions and experimental requirements is suggested. Experi-

mental results from three diverse remote sites illustrate practical applications of the profiling system, including an investigation of the structure of surface inversions over an ice shelf in Antarctica. (Auth. mod.)

### I-57794

Hinkley, T., Pertsiger, F., Zav'ialova, L., **Modern atmospheric background dust load: recognition in central Asian snowpack, and compositional constraints**, *Geophysical research letters*, July 1, 1997, 24(13), p.1607-1610, 16 refs.

Dusts in strata of snowpack in the Alai-Pamir range, Kirghizstan, Central Asia, have chemical compositions that are in the same restricted range as those of the dusts found in snowpacks at three other locations: central south Greenland, the St. Elias (Alaska), and coastal Antarctica, where special-type local dust sources certainly cannot dominate. This similarity at the four widely separated sites appears to indicate that there is a modern atmospheric background dust that is the same on a regional, hemispheric, or global scale. The present study partially determines the chemical composition of the background dust, and confirms its existence in snowpack at four localities worldwide, including the center of the earth's largest continent where dusts of local source have considerable influence. (Auth. mod.)

### I-57795

Allen, D.R., Stanford, J.L., Elson, L.S., Fishbein, E.F., Froidevaux, L., Waters, J.W., **4-day wave as observed from the Upper Atmosphere Research Satellite Microwave Limb Sounder**, *Journal of the atmospheric sciences*, Feb. 1, 1997, 54(3), p.420-434, 40 refs.

The "4-day wave" is an eastward moving quasi-nondispersive feature with period near 4 days occurring near the winter polar stratopause over Antarctica. This paper presents evidence of the 4-day feature in Microwave Limb Sounder (MLS) temperature, geopotential height, and ozone data from the late southern winters of 1992 and 1993. Space-time spectral analyses reveal a double-peaked temperature structure consisting of one peak near the stratopause and another in the lower mesosphere, with an out-of-phase relationship between the two peaks. This double-peaked structure is reminiscent of recent three-dimensional barotropic/baroclinic instability model predictions and is observed here for the first time. (Auth. mod.)

### I-57797

Lubin, D., Harper, D.A., **Cloud radiative properties over the South Pole from AVHRR infrared data**, *Journal of climate*, Dec. 1996, 9(12)pt.III, p.3405-3418, 26 refs.

Over the antarctic plateau, the radiances measured by the AVHRR middle infrared channels are shown to depend on effective cloud temperature, emissivity, ice water path, and effective radius of the particle size distribution. AVHRR imagery can be used to characterize cloud optical properties over the antarctic continent if surface weather observations and/or radiosonde data can be collocated with the satellite overpasses. From AVHRR imagery covering the South Pole during 1992, the mean cloud emissivity is estimated at 0.43 during summer and 0.37 during winter. When a radiative transfer model is used to evaluate these results in comparison with surface pyrgeometer measurements, the comparison suggests that the AVHRR retrieval method captures the overall behavior in cloud properties. During months when the polar vortex persists, AVHRR infrared radiances may be noticeably influenced by polar stratospheric clouds. (Auth. mod.)

### I-57809

Wessel, S., **Tropospheric ozone variations in polar regions** [Troposphärische Ozonvariationen in Polarregionen], *Berichte zur Polarforschung*, 1997, No.224, 188p., In German with English summary. Refs. p.141-152.

A close examination was made of the chemical and dynamical processes at work during the tropospheric ozone minima in both polar regions. Analysis of the results of this phase led to the construction of a scenario of four statements on which a model calculation was established: sea-salt aerosols can be accumulated on the snow surface during polar winters in the region between the boundaries of summer and winter sea ice; the accumulated sea-salt bromide can be liberated by oxidation with hydrogen peroxide after polar sunrise; hydrogen peroxide can also accu-



multate on the snow surface through precipitation of snow or rain; inside the liquid layer of the snow surface, hydrogen peroxide can oxidize bromide to molecular bromine which is then liberated to the gas phase; molecular bromine is photolyzed to form bromine atoms which react with ozone and initiate a catalytic ozone destruction; and the ozone depleted air parcel is transported to the measuring site. (Auth. mod.)

### I-57811

Kreutz, K.J., Mayewski, P.A., Meeker, L.D., Twickler, M.S., Whitlow, S.I., Pittalwala, I.I., **Bipolar changes in atmospheric circulation during the Little Ice Age**, *Science*, Aug. 29, 1997, 277(5330), p.1294-1296, 52 refs.

Annually dated ice cores from Siple Dome, West Antarctica and central Greenland indicate that meridional atmospheric circulation intensity increased in the polar South Pacific and North Atlantic at the beginning (ca. 1400) of the most recent Holocene rapid climate change event, the Little Ice Age (LIA). As deduced from chemical concentrations at these core sites, the LIA was characterized by substantial meridional circulation strength variability, and this variability persists today despite strong evidence for an end to LIA cooling. Thus, increased late 20th century storm variability may be in part a result of the continuation of these climatic fluctuations. (Auth.)

### I-57845

Bañón García, M., **Statistical summaries of meteorological variables at Juan Carlos I Station** [Resúmenes climatológicos de las campañas desarrolladas en la Base Juan Carlos I], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.303-324, In Spanish with English summary. 5 refs.

Data obtained from meteorological observations, carried out at Juan Carlos I Station between 1988 and 1993, are discussed and presented in tables. It is noted that all the meteorological variables recorded at the station keep within normal values registered on the South Shetland Is.

### I-57846

Rodríguez, R., Llasat, M.C., **Temporal-spectral analysis of temperatures at the Arturo Prat Station** [Análisis temporal-espectral de las series de temperatura de la base antártica Arturo Prat], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.325-344, In Spanish with English summary. 9 refs.

A study has been carried out of the evolution of mean and extreme temperatures, and of the thermal interval for a period of 29 years, at the Arturo Prat Station. Points of discontinuity were first resolved and the series was subjected to statistical analysis, which revealed a certain homogeneity of the series and a close dependence of mean temperature on minimal temperature. Analysis of the temporal trend showed a rise in minimal temperatures accompanied by a fall in maximum temperatures, thus resulting in a reduction of the thermal interval. After standardization of the series, the temporal distribution of thermal anomalies was analyzed. Finally, spectral analysis highlighted the annual and half-yearly periodicities and signs of a quasi-biennial periodicity, while the minimums and means series pointed to a period of 7-8 years. (Auth.)

### I-57847

Gil, M., Yela, M., Rodríguez, S., Cacho, J., **Spectrometry network for equilibrium studies of the NO<sub>x</sub>-O<sub>3</sub> system** [Red de espectrómetros para el estudio del equilibrio del sistema NO<sub>x</sub>-O<sub>3</sub>], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.345-353, In Spanish with English summary. 10 refs.

An ongoing program between Spain and Argentina designed to study the lower stratosphere, particularly the evolution of NO<sub>2</sub> and O<sub>3</sub> in West Antarctica, is outlined. The design and installation plans of three units of diffused-solar-light spectrometers, operating in the blue-violet areas of the spectrum, are discussed and illustrated. Three sites were selected for network operations: Ushuaia and the Marambio and Belgrano stations.

### I-57860

Moore, C.A., **Warming up to hot new evidence**, *International wildlife*, Jan.-Feb. 1997, 27(1), p.20-25.

This paper reports what scientists have discovered about our warming planet, compared to theoretical predictions, including the likelihood of antarctic ice sheet melting. (Auth. mod.)

### I-57861

Chappellaz, J., et al, **Changes in the atmospheric CH<sub>4</sub> gradient between Greenland and Antarctica during the Holocene**, *Journal of geophysical research*, July 20, 1997, 102(D13), p.15,987-15,997, Refs. p.995-997.

This study employs two antarctic ice cores, D47 and Byrd, whose gas-trapping conditions are comparable to a Greenland reference from GRIP. Also presented are new CH<sub>4</sub> measurements from the antarctic ice cores that cover the Holocene period, and are compared to the results with a refined GRIP CH<sub>4</sub> profile. The high resolution of these records reveals 4 different time periods when the CH<sub>4</sub> inter-polar difference significantly changed. A three-box model is used to interpret this analytical signal in terms of changes in the CH<sub>4</sub> source strengths in the tropical regions and middle to high latitudes of the Northern Hemisphere during the Holocene. (Auth. mod.)

### I-57862

Lou, G.P., Alyea, F.N., Cunnold, D.M., Kindler, T.P., **N<sub>2</sub>O transport in a three-dimensional model driven by U.K. Meteorological Office winds**, *Journal of geophysical research*, July 20, 1997, 102(D13), p.16,065-16,087, Refs. p.16,086-16,087.

In this study the stratospheric antarctic polar vortex structure and its evolution are examined on the basis of N<sub>2</sub>O measurements and model calculations. A separation of the calculated contributions into quasi-horizontal eddy mixing and the residual circulation terms is used to provide information on vortex isolation, on transport relative to the tropical and polar vortex barriers, and on climatological/seasonal changes in the stratospheric N<sub>2</sub>O distribution. The structure of the stratospheric antarctic vortex as seen in N<sub>2</sub>O and the transport of N<sub>2</sub>O in the Southern Hemisphere during the spring of 1992 is described. (Auth. mod.)

### I-57864

Lu, J.J., Mohnen, V.A., Yue, G.K., Atkinson, R.J., Matthews, W.A., **Intercomparison of stratospheric ozone profiles obtained by Stratospheric Aerosol and Gas Experiment II, Halogen Occultation Experiment, and ozonesondes in 1994-1995**, *Journal of geophysical research*, July 20, 1997, 102(D13), p.16,137-16,144, 27 refs.

In this paper, the authors report on recent intercomparison studies of stratospheric ozone profiles obtained during 1994-95 when the Pinatubo effect is minimized. This work involves two satellite-borne techniques, SAGE II data version 5.93 and HALOE data versions 17 and 18, and three ozonesonde stations: one in the northern mid-latitude (Payerne, Switzerland) and two in the southern mid-latitudes (Lauder, New Zealand, and Macquarie I.). (Auth. mod.)

### I-57931

Hernandez, G., Smith, R.W., **Upper mesosphere dynamical behavior near South Pole**, NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.10, Tokyo, National Institute of Polar Research, Jan. 1997, p.69-80, 11 refs.

Recent ground-based measurements of the neutral winds and temperatures at mesospheric heights near the Earth's rotational pole, at Amundsen-Scott Station, show that the neutral atmosphere has a restricted zonal wavenumber behavior at very-high latitudes. This can be interpreted as



the natural response of the atmosphere to the boundary conditions at the rotational pole(s). Experimentally, mostly planetary-scale waves have been observed during the austral winter. (Auth.)

### I-57932

Watanabe, T., Kandori, T., **11-year solar cycle dependence of stratospheric temperature and total ozone content over Syowa Station, Antarctica**, NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.10, Tokyo, National Institute of Polar Research, Jan. 1997, p.81-90, 8 refs.

Analysis of radiosonde observations over Showa Station was performed to determine influences of 11-year solar activity on the stratosphere in the high-latitude region. For antarctic winter seasons of 1967-1993 relatively high temperatures were observed on the 30 hPa level, during the solar maximum phase, for the westerly QBO. A positive correlation between the total ozone content over Showa Station and the 11-year solar activity is found for early spring (Oct.) during the easterly QBO years. High stratospheric temperatures at the 30 hPa level were associated with an increase in the ozone content. The global circulation of the stratospheric ozone in early spring is suggested to be enhanced in the easterly QBO phase, during the interval of a high solar activity. (Auth. mod.)

### I-57939

O'Dowd, C.D., Lowe, J.A., Smith, M.H., Davison, B., Hewitt, C.N., Harrison, R.M., **Biogenic sulphur emissions and inferred non-sea-salt-sulphate cloud condensation nuclei in and around Antarctica**, *Journal of geophysical research*, June 20, 1997, 102(D11), p.12,839-12,854, Refs. p.12,853-12,854.

Accumulation mode aerosol properties and biogenic sulphur emissions over the South Atlantic and antarctic oceans are examined. Two contrasting air masses, polar and maritime, each possessing distinct aerosol properties, were encountered during the summer months. By examining aerosol volatile properties, polar air masses arriving from the antarctic continent were shown to consist primarily of  $\text{H}_2\text{SO}_4$  in the accumulation mode size range. These results suggest a deficit of ammonia in polar air masses compared with that in maritime air masses. Dimethyl sulphide (DMS) exhibited no correlation with its putative aerosol oxidation products. During the austral summer of 1992-93, a period of strong biological productivity in the Weddell Sea and subantarctic ocean, particularly during ice-melt, the cruise-average DMS flux corresponded to a very modest average nss-sCCN concentration. Events of new particle formation were identified in the Weddell Sea and occurred under conditions of high DMS flux and low aerosol surface area. (Auth. mod.)

### I-57940

Notholt, J., Toon, G.C., Lehmann, R., Sen, B., Blavier, J.F., **Comparison of arctic and antarctic trace gas column abundances from ground-based Fourier transform infrared spectrometry**, *Journal of geophysical research*, June 20, 1997, 102(D11), p.12,863-12,869, 30 refs.

Column abundances of several atmospheric trace gases have been derived from solar absorption spectra measured from McMurdo Station in 1986, and from solar and lunar absorption spectra recorded in Ny Ålesund, Spitsbergen during winter and spring 1992-95. The results clearly show that denitrification in the antarctic lower stratosphere results in much smaller column abundances of  $\text{HNO}_3$  than in the Arctic. The springtime recovery of HCl in the Antarctic showed a stronger increase than in the Arctic. The  $\text{ClONO}_2$  peak occurred about 1 month later in the Antarctic and was found to be less pronounced than in the Arctic. The model runs imply that in the Antarctic the reconversion of  $\text{ClONO}_2$  to HCl occurs about 1 month later than in the Arctic. Furthermore, the results imply that any differences in the  $\text{O}_3$  depletion are caused mainly by differences in the stratospheric temperatures and dynamics and only to a small extent by the increased chlorine loading. The total column abundances of the short-lived tropospheric trace gases are found to be up to 10 times higher in the Arctic compared with the Antarctic, reflecting the hemispheric imbalance in production. (Auth. mod.)

### I-57941

Parthiban, S., Raghunandan, B.N., Sumathi, R., **Ab initio study of  $\text{XOClO}_3$  (X=Cl, F, and H): implications for formation of  $\text{ClOClO}_3$  in the stratosphere**, *Journal of geophysical research*,

June 20, 1997, 102(D11), p.12,927-12,935, 32 refs.

The primary photochemistry of  $\text{OClO}$  remains controversial. The present study investigates the equilibrium structures and harmonic vibrational frequencies of chlorine species at Hartree-Fock levels. The paper draws attention to the possible role of  $\text{Cl}_2\text{O}_4$  formation in the antarctic polar stratosphere with relevance to ozone layer depletion. (Auth. mod.)

### I-57942

Cacciani, M., Fiocco, G., Colagrande, P., Di Girolamo, P., Di Sarra, A., Fuà, D., **Lidar observations of polar stratospheric clouds at the South Pole. 1. Stratospheric unperturbed conditions, 1990**, *Journal of geophysical research*, June 20, 1997, 102(D11), p.12,937-12,943, 12 refs.

Observations of polar stratospheric clouds (PSCs) carried out at the Amundsen-Scott Station by lidar in the winter of 1990 are reported. Echoes attributable to PSCs began to appear in late May, were a persistent feature till early Sep., and from that time until the end of Oct. were sporadically observed. Analyses based on the sensitivity of the backscattering to temperature confirm that the attribution of the echoes to PSC type I or II is possible in some cases. Those that could be ascribed to type II were observed mostly during July and Aug., while those attributable to type I appeared only at the beginning of the winter. The comparison of water vapor mixing ratios derived from PSC type II occurrence temperatures and frost point hygrometer measurements indicates a fast dehydration in the beginning of the winter. (Auth. mod.)

### I-57943

Cacciani, M., Colagrande, P., Di Sarra, A., Fuà, D., Di Girolamo, P., Fiocco, G., **Lidar observations of polar stratospheric clouds at the South Pole. 2. Stratospheric perturbed conditions, 1992 and 1993**, *Journal of geophysical research*, June 20, 1997, 102(D11), p.12,945-12,955, 15 refs.

Observations of polar stratospheric clouds (PSCs), carried out at the Amundsen-Scott Station by lidar from May 1992 through Oct. 1993, are reported and compared with previously obtained results. At that time the antarctic stratosphere was loaded with sulfuric acid aerosol due to the eruptions of Mount Pinatubo. The seasonal evolution of the backscatter profiles has been investigated in relation to the presence of the volcanic aerosol and to the processes of PSC formation, particle sedimentation, and dehydration. It is concluded that only a small fraction of the aerosol particles, probably those with the largest radii, were involved in the nucleation of PSC particles. (Auth. mod.)

### I-57944

Slusser, J.R., Fish, D.J., Strong, E.K., Jones, R.L., Roscoe, H.K., Sarkissian, A., **Five years of  $\text{NO}_2$  vertical column measurements at Faraday (65°S): evidence for the hydrolysis of  $\text{BrONO}_2$  on Pinatubo aerosols**, *Journal of geophysical research*, June 20, 1997, 102(D11), p.12,987-12,993, 23 refs.

Summertime measurements of  $\text{NO}_2$  vertical column amounts over a 5 year period from May 1990 until Feb. 1995 from Faraday Station show a marked reduction following the arrival of the Mount Pinatubo volcanic aerosol in Dec. 1991. Model calculations show that this reduction can be explained by  $\text{BrONO}_2$  and  $\text{N}_2\text{O}_5$  hydrolysis on the volcanically enhanced aerosol. Over the time span of the measurements the known increases in chlorine and bromine loadings have an effect of less than 2% on midsummer  $\text{NO}_2$  columns. The total ozone loss increases by 38% at 16 km as a result of heavy aerosol loading. (Auth. mod.)

### I-57945

Grooss, J.U., Pierce, R.B., Crutzen, P.J., Grose, W.L., Russell, J.M., III, **Re-formation of chlorine reservoirs in southern hemisphere polar spring**, *Journal of geophysical research*, June 20, 1997, 102(D11), p.13,141-13,152, Refs. p.13,151-13,152.

This paper focuses on the recovery of chlorine reservoir species in the lower stratosphere in late antarctic spring. The investigations are based on measurements from the Halogen Occultation Experiment (HALOE) on board the Upper Atmosphere Research Satellite (UARS) and the Mainz photochemical box model and the NASA Langley Research Center trajectory model. During late antarctic spring 1994, HALOE observed high HCl mixing ratios in the ozone-depleted air inside the polar vortex. These val-



ues correspond approximately to the sum of all available inorganic chlorine species. In the preceding period of chlorine activation on polar stratospheric clouds (PSCs), the observed HCl mixing ratios in some cases were below 0.3 ppbv. Box model calculations are presented that assess the rate of HCl increase in late spring when heterogeneous chemistry on polar stratospheric clouds becomes insignificant. (Auth. mod.)

#### I-57946

Jaeglé, L., et al, **Evolution and stoichiometry of heterogeneous processing in the antarctic stratosphere**, *Journal of geophysical research*, June 20, 1997, 102(D11), p.13,235-13,253, Refs. p.13,251-13,253.

Simultaneous *in situ* measurements of HCl and ClO have been made for the first time in the Southern Hemisphere, allowing a systematic study of the processes governing chlorine activation between 15 and 20 km in the 1994 antarctic winter. The wintertime loss of HCl in air recently exposed to extreme temperatures is found to be correlated with high levels of reactive chlorine expected from the stoichiometry of the heterogeneous reaction of hydrochloric acid with chlorine nitrate on polar stratospheric clouds (PSCs). To constrain the role of different heterogeneous reactions and PSC types, a photochemical trajectory model is used which includes sulfate and PSC chemistry. This analysis implies that in the edge region of the antarctic vortex, the observed near-total removal of HCl can result from latitudinal excursions of air parcels in and out of sunlight during the winter, which photochemically resupply HOCl and ClONO<sub>2</sub> as oxidation partners for HCl. (Auth. mod.)

#### I-57947

Del Negro, L.A., et al, **Evaluating the role of NAT, NAD, and liquid H<sub>2</sub>SO<sub>4</sub>/H<sub>2</sub>O/HNO<sub>3</sub> solutions in antarctic polar stratospheric cloud aerosol: observations and implications**, *Journal of geophysical research*, June 20, 1997, 102(D11), p.13,255-13,282, Refs. p.13,280-13,282.

Airborne measurements of total reactive nitrogen (NO<sub>y</sub>) and polar stratospheric cloud (PSC) aerosol particles were made in the Antarctic as part of the NASA Airborne Southern Hemisphere Ozone Experiment/Measurements for Assessing the Effects of Stratospheric Aircraft (ASHOE/MAESA) campaign in late July 1994. As found in both polar regions during previous studies, substantial PSC aerosol volume containing NO<sub>y</sub> was observed at temperatures above the frost point, confirming the presence of particles other than water ice. Throughout the PSC region, a comparison of the number of particles between 0.4 and 4.0 µm diameter with the number of available nuclei indicates that a significant fraction of the background aerosol number participates in PSC growth. The results improve the understanding of PSC aerosol formation in polar regions while strengthening the requirement to include STS aerosols in studies of polar ozone loss and the effects of aircraft emissions. (Auth. mod.)

#### I-57962

Gordon, H.B., O'Farrell, S.P., **Transient climate change in the CSIRO coupled model with dynamic sea ice**, *Monthly weather review*, May 1997, 125(5), p.875-907, Refs. p.905-907.

The CSIRO coupled model has been used in a "transient" greenhouse experiment. This model contains atmospheric, oceanic, comprehensive sea-ice, and biospheric submodels. The model control run employed flux corrections and displayed only a small amount of cooling, mainly at high latitudes. The warming in the transient run had an asymmetrical response as seen in other coupled models, with the Northern Hemisphere (NH) warming more than the Southern Hemisphere (SH). In the control run the ice model gave realistic ice distributions at both poles, with the NH ice in particular displaying considerable interdecadal variability. In the transient run the ice amount decreased more in the NH than the SH. During the transient run there is a freshening of the surface salinity in the oceans at high latitudes. In the SH this is caused mainly by increases in precipitation over evaporation. (Auth. mod.)

#### I-57963

Shindell, D.T., Wong, S., Rind, D., **Interannual variability of the antarctic ozone hole in a GCM. Part I: the influence of tropospheric wave variability**, *Journal of the atmospheric sciences*, Sep. 15, 1997, 54(18), p.2308-2319, 18 refs.

To study the interannual variability of the antarctic ozone hole, a physically realistic parameterization of the chemistry responsible for severe polar ozone loss has been included in the GISS GCM. The ensuing ozone hole agrees well with observations, as do modeled surface UV increases of up to 42%. The presence of the ozone hole causes a reduction in lower stratospheric solar heating and an increase in upper stratospheric descent and dynamical heating in the model, as expected. However, both the degree of ozone depletion and the dynamical response exhibit large interannual variability. The results are in accord with observational studies showing a strong anticorrelation between the interannual variability of tropospheric wave forcing and of the antarctic ozone hole, suggesting that midwinter tropospheric wave energy may be the best predictor of the severity of the ozone hole the following spring. (Auth. mod.)

#### I-57989

Edwards, N.R., Mobbs, S.D., **Observations of isolated wave-turbulence interactions in the stable atmospheric boundary layer**, *Royal Meteorological Society. Quarterly journal A*, Apr. 1997, 123(539), p.561-584, This paper is a practical application of the model built and discussed in: "Modelling isolated wave-turbulence interactions in the stable atmospheric boundary layer," by Edwards and Mobbs, Q.J.Roy. Met. Soc., (1997), 123:585-604. 11 refs.

Turbulence measurements of the stable atmospheric boundary layer made at Halley Station are presented. The interaction between small-scale turbulence and larger solitary wave disturbances is investigated. Spectral methods are used to separate the wave and turbulence parts of the flow, and the appropriateness of this approach is discussed. Both individual wave events and an average of 18 wave events are studied. The transport of wave-induced velocity by wave-induced turbulence is found to be mostly upwards, whilst a strong downward turbulent heat flux accompanies each wave. Waves are often found to be associated with a burst of low-level turbulence which occurs later than the perturbation in the mean shear. The effect of the turbulence on the wave is shown to be small, whilst the instantaneous local effect of the wave on the turbulence appears to be approximately linear in the wave amplitude. Comparisons are made between the observations and numerical predictions. These tend to confirm the need for at least second-order closure schemes for the turbulence modelling. (Auth.)

#### I-57998

Lowe, D.C., Manning, M.R., Brailsford, G.W., Bromley, A.M., **1991-92 atmospheric methane anomaly: southern hemisphere <sup>13</sup>C decrease and growth rate fluctuations**, *Geophysical research letters*, Apr. 15, 1997, 24(8), p.857-860, 31 refs.

Measurements of atmospheric methane from 1989-1996 at Baring Head, New Zealand, and at Scott Base show a seasonal cycle in the mixing ratio with a peak to peak amplitude of 18 ppb. The simultaneous changes in the mixing ratio growth rate and δ<sup>13</sup>C together with the rapid drop and slow recovery in the latter provide a stringent test of possible causes. Although a combination of causes cannot be ruled out, decreased emissions from an isotopically heavy source such as biomass burning best meet the constraints of the data. (Auth. mod.)

#### I-58002

Kaneto, S., **Features of weather around Syowa Station in the ACR period, 1987-1991**, *Antarctic record*, Mar. 1997, 41(1), p.1-8, In Japanese with English summary. 8 refs.

Meteorological data obtained at Showa and Asuka stations during 1987-1991 are compared with normal values and data from Mizuho Station. At Showa Station, the first half of the period of observation was characterized by weak wind, little snow accumulation and sea ice drifting away from the shore during summer. In the lower stratosphere, the strongest sudden warming was observed in the spring of 1988, with no decay of the polar vortex. At Asuka Station, the data showed that the yearly mean wind speed is highest at inland stations. (Auth. mod.)

#### I-58003

Kikuchi, T., **Temperature, wind and atmospheric circulation in East Queen Maud Land, Antarctica**, *Antarctic record*, Mar. 1997, 41(1), p.9-22, In Japanese with English summary. Refs.



p.21-22.

Proxy observations of wind and temperature are carried out in eastern Queen Maud Land. The atmospheric circulation patterns are studied by *in situ* observations of the diurnal wind vector variation and the upper air soundings. It is found that the high wind directional constancy at Mizuho Station is derived not only from the katabatic wind but also from the general synoptic pressure patterns. The katabatic wind is weakened when the westerly wind intensifies as part of the 30- to 50-day cycle synoptic pattern changes. (Auth. mod.)

#### I-58004

Yamanouchi, T., **Cloud distribution in the Antarctic from satellite data**, *Antarctic record*, Mar. 1997, 41(1), p.23-40, In Japanese with English summary. Refs. p.39-40.

Analyses of cloud distribution in the Antarctic, based on data of NOAA AVHRR channels 3, 4, and 5 received at Showa Station, are discussed. Brightness temperature differences of the channels are found effective in detecting clouds. A significant difference was found between the cloud cover over the continental ice sheet and that over the ocean. Compared to the cloud distribution determined from surface measurements, cloud cover determination from the temperature difference between channels 3 and 4, in summer, showed good agreement. However, between channels 4 and 5 in summer and winter, there was only a vague agreement. Results showing cloud distribution over East Antarctica throughout the year are presented. (Auth. mod.)

#### I-58005

Aoki, T., **Radiation observations at Asuka Station, Antarctica and radiative properties of the atmosphere and snow surface**, *Antarctic record*, Mar. 1997, 41(1), p.41-62, In Japanese with English summary. Refs. p.61-62.

Radiation observations at Asuka Station in 1988 are summarized. The diurnal and seasonal variations of net radiation at different antarctic stations are compared. Snow albedo is simulated with a multiple scattering model for the atmosphere-snow system. Results show that the spectral albedo of snow depends on the snow grain size, solar zenith angle, cloud condition and structure of snow layers. It is shown that near infrared wavelengths are effective for remote sensing of the snow physical parameters and discrimination between the snow surface and clouds from space. (Auth. mod.)

#### I-58007

Nakagawa, K., **Surface temperature distribution in Lützow-Holm Bay and its neighborhood**, *Antarctic record*, Mar. 1997, 41(1), p.73-81, In Japanese with English summary. 6 refs.

All the NOAA/AVHRR thermal infrared images received at Showa Station from Feb. 1990 to Jan. 1991 were analyzed to make temperature distribution maps. From this analysis the warmer area in midslope, i.e. the so-called thermal belt, appeared on the ice sheet slope along the coast around Lützow-Holm Bay, especially on the Sôya Coast, frequently in winter. The relationship between the thermal belt on the Sôya Coast and the surface inversion layer over Showa Station was investigated. When the surface inversion layer thickness increased, the thermal belt was displaced toward the interior or higher part of the ice sheet slope. (Auth. mod.)

#### I-58008

Yamanouchi, T., **Radiative effects of clouds and cryosphere in the Antarctic**, *Antarctic record*, Mar. 1997, 41(1), p.83-102, In Japanese with English summary. Refs. p.101-102.

Examination of the effects of clouds, ice sheet and sea ice on the radiation budget in the Antarctic using Earth Radiation Budget Experiment (ERBE) data are reported. The continental ice sheet affects not only the albedo, but also the surface temperature because of elevation, and hence the OLR. Sea ice, which is a critical climate feedback factor, appears to have less impact on radiation than do clouds. However, these surfaces lie underneath clouds, and it was found that the independent effect of sea ice is as large as that of clouds, and clouds are masking the radiative effect of sea ice by more than half. The radiation budget at the top of the atmosphere from satellite observation and that at the surface from the surface radiation measurements at Showa and Amundsen-Scott stations were compared. Cloud radiative forcing at both stations for the surface, atmosphere and top of the atmosphere was derived. (Auth.)

#### I-58009

Konishi, H., Endoh, T., **Characteristics and seasonal variations of precipitation phenomena at Syowa Station**, *Antarctic record*, Mar. 1997, 41(1), p.103-129, In Japanese with English summary. Refs. p.128-129.

Long-term observations of precipitating clouds were carried out at Showa Station in 1989. The seasonal variations of clouds and precipitation were analyzed corresponding to the seasonal changes of air temperature and sea ice area. The occurrence frequencies of cloud vortices which brought snowfall to Showa Station increased in the fall and spring seasons corresponding to activity of the circumpolar trough. However, the activities of cloud systems that bring precipitation weaken in spring when the sea ice area expands to low latitudes, because of less supply of heat and vapor. In 1989, the amount of precipitation in the spring, brought by a few snowfall events, was equal to the amount of precipitation in the fall, brought by frequent snowfall events. Radar observations revealed that there were 3 abundant snowfall seasons at Showa Station, and the amount of snowfall was uniform in all seasons except summer. The amounts of precipitation in fall, winter and spring were 74, 74 and 53 mm, respectively. (Auth. mod.)

#### I-58010

Wada, M., Konishi, H., **Observations of precipitable water, column liquid water and column ice water at Syowa Station**, *Antarctic record*, Mar. 1997, 41(1), p.131-148, In Japanese with English summary. 10 refs.

Observations of water vapor, liquid water content and ice water content in the atmosphere were carried out at Showa Station in 1988. Precipitable water, column liquid water and column ice water were measured. This paper reports the results and the relationships among them and temperature, humidity and satellite brightness temperatures. Based on the relations, the characteristics of clouds and precipitation are discussed. (Auth.)

#### I-58011

Yamazaki, K., **Seasonal variation of atmospheric water circulation in the antarctic region derived from objective analysis data**, *Antarctic record*, Mar. 1997, 41(1), p.149-160, In Japanese with English summary. 8 refs.

Precipitable water, total moisture flux and its convergence are calculated, based on the 6-year (1986-1991) investigation in the antarctic region. The precipitable water increases in summer, but the zonal mean poleward moisture flux and its convergence, which correspond to "precipitation minus evaporation", increase in winter; they also exhibit semi-annual variation. This is due to the seasonal variation of moisture flux and its convergence, which are controlled by the cyclonic activity in the Antarctic. The westward moisture flux, which does not exist in the Arctic, is seen poleward of 70° along the antarctic continent; it is pronounced in summer. It is found that the atmospheric water circulation in the antarctic region is very active compared with the global mean, especially in winter. (Auth. mod.)

#### I-58012

Aoki, S., Nakazawa, T., **Continuous measurement of atmospheric CO<sub>2</sub> concentration at Syowa Station**, *Antarctic record*, Mar. 1997, 41(1), p.161-176, In Japanese with English summary. Refs. p.175-176.

Precise and continuous measurements of atmospheric CO<sub>2</sub> concentration have been carried out at Showa Station since Feb. 1984. Diurnal CO<sub>2</sub> variation was hardly observable throughout the year. The secular CO<sub>2</sub> trend was variable with time, showing a slow increase in 1984, 1986 and 1988 and a rapid increase in 1985 and 1987. The average rate of annual CO<sub>2</sub> increase over the last 5 years was about 1.6 ppmv/yr. The average seasonal CO<sub>2</sub> cycle showed minimum and maximum concentrations in mid-Apr. and in early Oct., respectively. Its peak-to-peak amplitude was about 1.1 ppmv for the period 1984-1988. The seasonal cycle was variable from year to year, but there was no indication of long-term amplitude increase. It is found that irregular CO<sub>2</sub> variations, with amplitudes of about 0.2 ppmv, have a high correlation with air mass exchange by synoptic scale weather disturbances. (Auth. mod.)



**I-58013**

Murayama, S., Nakazawa, T., Aoki, S., Morimoto, S., **Variations of the carbon and oxygen isotopic ratios of atmospheric CO<sub>2</sub> at Syowa Station, Antarctica**, *Antarctic record*, Mar. 1997, 41(1), p.177-190, In Japanese with English summary. Refs. p.189-190.

Measurements of stable isotopic ratios of atmospheric CO<sub>2</sub> were carried out at Showa Station since 1986. The average peak-to-peak amplitude of the seasonal cycle of  $\delta^{13}\text{C}$  was about 0.04 per mill, with the maximum in autumn and the minimum in spring. It is found that air with high CO<sub>2</sub> concentration, influenced by the exchange between the atmosphere and the biosphere and/or combustion of fossil fuel, occurs at the station from late fall to early spring, while air of oceanic origin, with low CO<sub>2</sub>, is transported from late spring to summer. The average increase rate of  $\delta^{13}\text{C}$  of atmospheric CO<sub>2</sub> between 1986 and 1990 was about -0.02 per mill/year. Interannual variations suggest that the principal cause could be an imbalance in the CO<sub>2</sub> exchange between the atmosphere and the biosphere; the  $\delta^{18}\text{O}$  of atmospheric CO<sub>2</sub> showed a clear seasonal cycle, with the maximum in summer and minimum in winter. (Auth. mod.)

**I-58014**

Murayama, S., Nakazawa, T., Aoki, S., **Concentration variations of tropospheric carbon dioxide over the antarctic region**, *Antarctic record*, Mar. 1997, 41(1), p.191-201, In Japanese with English summary. Refs. p.200-201.

Measurements of the atmospheric CO<sub>2</sub> concentration were carried out over Showa Station since 1983. The minimum concentration of the average seasonal CO<sub>2</sub> cycle appears in Mar. throughout the troposphere, while the maximum concentration occurs in mid-Aug. in the upper troposphere and, in late Sep., in the middle and lower troposphere. The peak-to-peak amplitude of the seasonal cycle decreases with height. The CO<sub>2</sub> concentration increases with height during most of the year. The average concentration difference between the upper troposphere and the ground surface is about 0.3 ppmv. It is hypothesized that the seasonal cycle of height-dependent atmospheric transport processes could influence the seasonal cycle and the vertical distribution of the CO<sub>2</sub> concentration over Showa Station. (Auth. mod.)

**I-58015**

Hashida, G., et al, **Measurements of the partial pressure of CO<sub>2</sub> in the air and surface sea water on board the icebreaker Shirase**, *Antarctic record*, Mar. 1997, 41(1), p.203-220, In Japanese with English summary. Refs. p.219-220.

The partial pressure of CO<sub>2</sub> in the surface water and lower troposphere were continuously monitored on board the icebreaker *Shirase* between Japan and Antarctica from Nov. 1987 to Mar. 1992. The atmospheric CO<sub>2</sub> concentration was high in the mid-Northern Hemisphere, decreased rapidly in the mid-Southern Hemisphere, and increased slightly in the antarctic region. The relations between pCO<sub>2</sub> variations and hydrographic conditions, such as the effect of coastal water and upwelling, are discussed. The region between the Subantarctic Front and the Polar Front, and the region south of the Polar Front are found to be very weak CO<sub>2</sub> sources and very weak CO<sub>2</sub> sinks. (Auth. mod.)

**I-58016**

Aoki, S., **Continuous measurement of atmospheric CH<sub>4</sub> concentration at Syowa Station**, *Antarctic record*, Mar. 1997, 41(1), p.221-230, In Japanese with English summary. Refs. p.229-230.

Precise and continuous measurement of atmospheric CH<sub>4</sub> concentration was initiated at Showa Station in Feb. 1988. A diurnal variation of CH<sub>4</sub> concentration was not observable throughout the year, but irregular variations with periods of a few days and an amplitude of about 5 ppbv, at most, were sometimes observed. A regular seasonal cycle of CH<sub>4</sub> concentration with a winter maximum and a summer minimum was clearly seen. The peak-to-peak amplitude of the averaged seasonal cycle was 30 ppbv. CH<sub>4</sub> concentration was secularly increasing; the mean rate of the increase between 1988 and 1992 was 10.4 ppbv/yr. (Auth.)

**I-58017**

Aoki, S., **Continuous measurement of surface O<sub>3</sub> concentration at Syowa Station and onboard Shirase**, *Antarctic record*,

Mar. 1997, 41(1), p.231-247, In Japanese with English summary. Refs. p.246-247.

Continuous measurements of lower tropospheric ozone were carried out at Showa Station since Feb. 1988. The diurnal variation of the lower tropospheric ozone was observable only during spring. The average amplitude of the diurnal variation reached a maximum value of about 2 ppb in Sep. and Oct. The maximum and minimum concentrations of the diurnal variations occurred before sunrise and in the afternoons, respectively. The daily mean ozone concentrations showed a clear seasonal cycle, with maximum concentration in winter and minimum concentration in summer, and mean amplitude of about 20 ppb. Minimum concentrations of the seasonal cycle were almost the same for each year, but maximum concentrations varied from year to year; higher concentrations appeared in 1988 and 1990, and lower concentrations in 1989, 1991 and 1992. These variations are ascribed to changes of the atmospheric circulation in the Antarctic. It was found that extremely low values of lower tropospheric ozone, with periods of a few days, appeared sporadically between Aug. and Oct. every year. (Auth. mod.)

**I-58018**

Murayama, S., Aoki, S., Nakazawa, T., **Relationship between tropospheric ozone concentration and atmospheric transport over Syowa Station, Antarctica**, *Antarctic record*, Mar. 1997, 41(1), p.249-258, In Japanese with English summary. 13 refs.

Measurements of the tropospheric O<sub>3</sub> concentration over Showa Station were carried out from May 1989 to Jan. 1990. The O<sub>3</sub> concentration increased with height for the whole period. Lower tropospheric O<sub>3</sub> concentration showed a prominent seasonal variation, with maximum concentration in winter and minimum in summer. In the upper troposphere, the concentration reached high values in winter, decreased gradually from Sep. to early Nov. and then increasing again. From the results, it is hypothesized that the seasonal variation of height-dependent atmospheric transport processes could influence that of the tropospheric O<sub>3</sub> concentration over Showa Station. (Auth. mod.)

**I-58019**

Matsubara, K., **Ozone observations by the Japanese Antarctic Research Expedition (JARE)**, *Antarctic record*, Mar. 1997, 41(1), p.259-269, In Japanese with English summary. 19 refs.

Ozone observations by the Japanese Antarctic Research Expedition have been carried out since 1961. In the period of the Antarctic Climate Research Project, new observations were carried out at Showa Station using instruments such as the Dobson Spectrophotometer and ozone-sonde. Surface ozone, UV-B radiation, columnar NO<sub>2</sub> and O<sub>3</sub>, total ozone and aerosol were determined using a Dasibi ozone meter, Brewer spectrophotometer, visible spectrometer, and Polar Patrol Balloon, respectively. Columnar and vertical ozone amount from the equatorial region to Antarctica, obtained on board the research vessel *Shirase*, are also reported. (Auth. mod.)

**I-58020**

Kondo, Y., Koike, M., **Chemistry of the reactive nitrogen in the antarctic stratosphere**, *Antarctic record*, Mar. 1997, 41(1), p.271-283, In Japanese with English summary. Refs. p.282-283.

The column amounts of NO<sub>2</sub> have been measured using a visible spectrometer at Showa Station since Mar. 1990. The NO<sub>2</sub> column exhibits a large seasonal variation, with a maximum in summer and a minimum in winter. The recovery of NO<sub>2</sub> in spring is 2-3 times slower than the fall decay. The low NO<sub>2</sub> level in mid-winter to early spring is considered to be due to a conversion into HNO<sub>3</sub> on PSCs and due to the denitrification by gravitational sedimentation of PSC particles. Results from a chemical box model agreed well with this slow rate of NO<sub>2</sub> increase in spring, when heterogeneous chemistry on PSCs was included. The reduction of NO<sub>2</sub> by 30% was found after the breakup of the austral polar vortex in 1992. (Auth. mod.)

**I-58021**

Kaneto, S., **Eruption of Mt. Pinatubo and climate of Syowa Station**, *Antarctic record*, Mar. 1997, 41(1), p.285-290, In Japanese with English summary. 5 refs.



In June 1991, the volcano Pinatubo erupted and injected a large volcanic cloud into the lower and middle stratosphere. In Aug. 1991, Mt. Hudson, in southern Chile, erupted; its volcanic cloud reaches up to 18 km. From NOAA/AVHRR data, within 1991, the volcanic aerosol of Pinatubo dispersed mainly in tropical latitudes and that of Hudson spread in the area south of 40°S. The eruption effects are investigated here by comparing meteorological observation results at Showa Station with global analyses. The optical observations which measure direct effects of eruption materials, show a significant effect in late 1991. Abnormal deviations were detected in surface temperature and total ozone amount. Effects on stratospheric temperature were not detected. (Auth. mod.)

#### I-58022

Kanamori, S., Kanamori, N., Watanabe, O., Nishikawa, M., Kamiyama, K., Motoyama, H., **Behavior of chemical components in the snow and atmosphere on the Mizuho Plateau, Antarctic record**, Mar. 1997, 41(1), p.291-309, In Japanese with English summary. 21 refs.

Atmospheric aerosols were studied at Showa Station from 1988 to 1990. Some chemicals, such as  $\text{exSO}_4^{2-}$ , MSA and  $\text{NH}_4^+$ , showed an annual trend, high in summer and low in winter. The seasonal variations of gaseous HCl,  $\text{SO}_2$ ,  $\text{HNO}_2$ ,  $\text{HNO}_3$  were also studied. The occurrence of very high HCl gas in summer, and the comparable concentrations of other gases to those of aerosols, were found. From the observation at 5 snow pits on the Mizuho Plateau, apparent seasonal variations in  $\delta^{18}\text{O}$ ,  $\text{Cl}^-$  and  $\text{Na}^+$  were found only at the 2 inland points. Most snow samples showed positive  $\text{exCl}^-$  values. A rough linear relationship among concentrations in chemicals was found between atmospheric aerosols and corresponding snow on the Mizuho Plateau; the concentration in the aerosol is roughly reflected in the snow composition. (Auth. mod.)

#### I-58029

Nakagawa, K., **Micrometeorology and heat balance over the fast ice, Antarctic record**, Mar. 1997, 41(1), p.385-394, In Japanese with English summary. 7 refs.

Micrometeorological conditions were observed over fast ice with overlying thick snow cover, and underlying deep sea approximately in the center of Ongul Strait in Lützow-Holm Bay from the end of Mar. to the beginning of Dec., 1990. The radiation balance showed an annual variation: it was negative for a period including the polar night, and changed to positive after Oct. Corresponding to the radiation balance, both sensible heat flux from air to snow and the conductive heat flux from the fast ice to snow, changed. The sensible heat flux changed with the radiation balance like a mirror image. As the prevailing wind velocity increased, the temperature and humidity increased; the radiative heat loss, the sensible heat flux from air to snow, and the conductive heat flow from the fast ice to snow, decreased. (Auth. mod.)

#### I-58031

Seko, K., **NOAA satellite observation in the Antarctic, Antarctic record**, Mar. 1997, 41(1), p.415-432, In Japanese with English summary. Refs. p.431-432.

The NOAA Satellite AVHRR data received at Showa Station offer simultaneous images on 5 wavelengths covering an area 2,000 km on a side with resolution of 1 km, which help to clarify a number of phenomena. The AVHRR is a radiometer which observes in 4 or 5 channels covering the visible and infrared regions. Phenomena in the atmosphere and at the snow surface can be studied from the AVHRR data. Data are received from at least one orbit per day and are of uniform quality. Results of the following analyses are summarized in this report: analysis using the time sequence of infrared channel data; detection of the katabatic wind information; and detection of the ice sheet surface and snow accumulation information. (Auth.)

#### I-58033

Endoh, T., Yamanouchi, T., Ishikawa, T., Kakegawa, H., Kawaguchi, S., **Dark streams observed on NOAA satellite images over the katabatic wind zone, Antarctica, Antarctic record**, Mar. 1997, 41(1), p.447-457, In Japanese with English summary. 7 refs.

In the katabatic wind zone, some characteristic streams are frequently observed in NOAA satellite images, especially in the winter season. These dark streams move and change location and their width slightly in a series of successive images; however, distributions seem to be restricted to areas of some specific topographies. The air temperature is not particularly low and remains steady, and the wind speed is constantly high, 13 m/s or more. The air temperature inside the stream is 15°C or higher than outside of it. Along the central line of the stream, the air temperature varies with height at the dry adiabatic lapse rate. It is suggested that these dark stream images are composed to a warmer air stream compared with that of the outside and a strongly forced downward current along the slope. (Auth. mod.)

#### I-58041

Key, J.R., Collins, J.B., Fowler, C., Stone, R.S., **High-latitude surface temperature estimates from thermal satellite data, Remote sensing of environment**, Aug. 1997, 61(2), p.302-309, 32 refs.

In this article, clear-sky surface-temperature retrieval algorithms for use with the Advanced Very High Resolution Radiometer (AVHRR) and the Along Track Scanning Radiometer (ATSR) for the Arctic and the Antarctic, over ocean and land, are presented. The methods are similar to those used in estimating sea and land surface temperatures but are developed with data specific to the polar regions. (Auth. mod.)

#### I-58046

Carrasco, J.F., Bromwich, D.H., **Mesoscale cyclone activity near the Antarctic Peninsula** [Un estudio de la actividad de ciclones a mesoescala en las cercanías de la península Antártica], *Santiago de Chile. Instituto Antártico Chileno. Serie científica*, 1996, No.46, p.83-101, In Spanish with English summary. Refs. p.99-101.

A study of the mesoscale cyclone activity, based on digital satellite images collected at the U.S. Palmer Station, was carried out near the Antarctic Peninsula during the Jan. 1991-Feb. 1992 period. A significant activity was observed on both sides of the Peninsula with a maximum during the summer months and a minimum during the winter. Trajectories of the mesoscale cyclones detected over the Bellingshausen Sea sector, showed that many of them moved toward and across the Drake Passage. Results reveal that deeper mesoscale vortices develop to the west of the Peninsula, and much less over the Weddell Sea sector. The synoptic analysis for days in which at least one mesoscale vortex was observed, indicates that they developed within a cold air mass confirming previous results. (Auth.)

#### I-58048

Fernández, E., Morales, R., Quilhot, W., **UV radiation on Robert I.** [Radiación UV solar en isla Robert, Shetland del Sur, Antártica], *Santiago de Chile. Instituto Antártico Chileno. Serie científica*, 1996, No.46, p.113-119, In Spanish with English summary. 14 refs.

Solar ultraviolet radiation measurements were carried out by means of chemical actinometry and spectroradiometric instruments on Robert I. during Jan. 1996. The maximal irradiances of the UV-A and UV-B spectral range were detected between 13:00 and 14:00 hrs (local time) during clear, sunny days. The actinometric measurements agree with the spectroradiometric determination ( $r=0.9936$ ) and permit the authors to propose this method for local and regional scale measurements. (Auth. mod.)

#### I-58069

Harangozo, S.A., Colwell, S.R., King, J.C., **Analysis of a 34-year air temperature record from Fossil Bluff (71°S, 68°W), Antarctica, Antarctic science**, Sep. 1997, 9(3), p.355-363, 21 refs.

An analysis of a long-term surface air temperature record for Fossil Bluff in the George VI Sound, West Antarctic Peninsula (WAP) documents in detail some important aspects of the climate of this area for the first time. The analysis identifies the close dependency of air temperatures on latitude in the WAP but reveals that the strength of this dependency is greatest in winter. This result along with others leads to the Fossil Bluff climate regime being characterized as 'continental' rather than 'maritime' as found further north. The WAP as a whole displays large interannual temperature variability, but this is greatest in Marguerite Bay rather than the Fossil Bluff area. Evidence is also provided for secular climatic



change appearing in summer throughout the WAP over the last few decades. The representativeness of existing Antarctic Peninsula annual air temperature climatologies, based mainly on snow temperature measurements, for the winter and summer periods is also noted. (Auth.)

#### I-58071

Villalba, R., et al, **Sea-level pressure variability around Antarctica since A.D. 1750 inferred from subantarctic tree-ring records**, *Climate dynamics*, July 1997, 13(6), p.375-390, Refs. p.389-390.

This study employs a spatial approach to evaluate large-scale climatic changes at high latitudes in the Southern Hemisphere over the past centuries. Instrumental records are used to identify the most consistent teleconnection patterns at high latitudes in the Southern Hemisphere during this century. These data are combined with high-resolution tree-ring records to provide a long-term perspective for the climatic variations which have occurred more recently. Tree-ring based reconstructions of the pressure gradient across Antarctica are used to infer large-scale circulation changes at higher latitudes in the Southern Hemisphere.

#### I-58078

Frenot, Y., Gloaguen, J.C., Van de Vijver, B., Beyens, L., **Holocene peat sediment dating and glacier oscillations** [Data-tion de quelques sédiments tourbeaux holocènes et oscillations glaciaires aux îles Kerguelen], *Académie des sciences, Paris. Comptes rendus. Série III*, July 1997, 320(7), p.567-573, In French with abridged version in English. 21 refs.

The retreat of the glacier snouts on Kerguelen Is. is clearly related to the slight warming and the reduced precipitation over the last 25 years. Organic deposits sampled on the new deglaciated areas have been dated using  $^{14}\text{C}$  method. Information on the ecological conditions that predominated during the formation of these peat deposits was assessed from their fossil diatom flora content. The range of the glacier fluctuations is discussed. Two warm periods are recognized, 10,000 and 5,000 yr B.P., respectively. A third period, 2,200-900 yr B.P., was characterized by small fluctuations of the glacier snouts. The current deglaciation, which began at the end of the Little Ice Age and accelerated 25 yr ago, is the most important since the beginning of the Holocene period. (Auth.)

#### I-58083

Kaneto, S., Azuma, N., Meshida, S., Iwasaki, A., Sukegawa, Y., Yamanouchi, T., **Antarctic climate research data, Part 6: aerological sounding data at Asuka Station, Antarctica from Jan. 1989 to Oct. 1991**, *Japanese Antarctic Research Expedition. JARE data reports*, Mar. 1997, No.221, 73p.

As part of the Antarctic Climate Research program, a study was conducted to determine interannual variations of the antarctic atmosphere. Data from aerological observations carried out at Asuka Station from Jan. 1989 to Oct. 1991, including upper air temperature, wind and humidity, are described and are presented in tables and graphs. Instrumentation used in the observational program and data processing are discussed.

#### I-58093

Turner, J., Corcoran, G., Cummins, S., Lachlan-Cope, T., Leonard, S., **Seasonal variability of mesocyclone activity in the Bellingshausen/Weddell region of Antarctica**, *Global atmosphere and ocean system*, 1996, Vol.5, p.73-97, Refs. p.96-97.

One year's AVHRR satellite imagery covering the Antarctic Peninsula and Weddell and Bellingshausen seas has been manually analyzed for mesocyclone activity. A total of 452 mesocyclones were identified with the majority existing for less than 6 hours. Most had a comma-shaped cloud signature. The modal size range was 300-399 km, although the reduction in numbers at larger diameters was small. There was a large annual cycle in mesocyclone activity with more developing in the summer, especially over the Ronne Ice Shelf. The mean latitude of formation changed by  $10^\circ$  over the year and had a more southerly location during the summer, suggesting a link with the sea ice cover. The synoptic-scale circulation had a marked effect on the month-to-month variations in mesocyclone formation. (Auth.)

#### I-58098

Zhao, J.L., **Climatic changes in the regions of Antarctic Great Wall Station, Southern Chile and South Georgia Island**, *Chinese journal of polar science. Series No.14*, June 1997, 8(1), p.27-32, 3 refs.

A comparative study is made of the climatic change curves in the Alerce region of southern Chile during the past 4000 y., the temperature and precipitation curves in the area around the Great Wall Station for the past 16,000 y., the fluctuation trend of the Antarctic Convergence for the past 4000 y., and climatic changes on South Georgia. It is concluded that the uniformity of environmental changes found in all the areas covered in the study confirms that they are controlled by one and the same factor: the fluctuations of the Antarctic Convergence. (Auth. mod.)

#### I-58101

Guo, S., Zhou, X.J., Lu, L.H., Zheng, X.D., Gao, X.J., **Measurement of  $\text{NO}_2$  and analysis of relationship between stratospheric  $\text{NO}_2$  and  $\text{O}_3$  over Zhongshan Station, Antarctica**, *Chinese journal of polar science. Series No.14*, June 1997, 8(1), p.48-55, 7 refs.

Continuous measurements of stratospheric as well as total column concentrations of  $\text{O}_3$  and  $\text{NO}_2$  over the Zhongshan Station are reported. Analyses of the seasonal variations of the two elements, and their relationship to the development of the ozone hole in 1993-1995, confirm that the decrease of atmospheric  $\text{NO}_2$  contributes significantly to ozone depletion.

#### I-58111

Röth, E.P., **Ozone hole over Antarctica** [Das Ozonloch über der Antarktis], *Ozonloch - Ozonsmog: Grundlagen der Ozonchemie. Meyers Forum 26. Ozone hole - ozone smog: fundamentals of ozone chemistry*, Mannheim, Germany, BI-Taschenbuchverlag, 1994, p.57-73, In German. A glossary and a list of references for the entire work are included.

#### DLC QC879.7.R682 1994

The progression of the ozone hole over Antarctica is reviewed for the period 1985-1994. A series of diagrams outlines the history of this progression: latitudinal changes in columnar thickness and concentration; ozone thicknesses in Oct., 1956-1957; altitude profile over the South Pole in Aug., Oct., and Dec. 1987; the annual march of ozone (in Dobson units) over Halley Station, 1957 and 1959; the geographic range, 75S-85N, of ozone columnar thicknesses during Apr., 1978 and Jan. and Oct. 1979; the expansion of ozone minimums over Antarctica during Oct., 1979-1989; and others.

#### I-58126

Hernandez, G., Smith, R.W., Kelley, J.M., Fraser, G.J., Clark, K.C., **Mesospheric standing waves near South Pole**, *Geophysical research letters*, Aug. 15, 1997, 24(16), p.1987-1990, 17 refs.

Optical measurements of mesospheric winds near South Pole during Aug. 1996 show the presence of large-scale standing waves with periods of 51.3-hr and 107-hr, respectively. The direction of the presently observed mean wind is nearly parallel to wind direction of the 51.3-hr standing oscillation, suggesting an interaction between the mean wind field and the wave during this observation. Based on the simultaneous observation at Scott Base of an uncommon wave, the 11.6-hr wave observed from South Pole can be identified as a zonal wavenumber one inertio-gravity mode of oscillation. (Auth. mod.)

#### I-58128

Mickley, L.J., Abbatt, J.P.D., Frederick, J.E., Russell, J.M., III, **Evolution of chlorine and nitrogen species in the lower stratosphere during Antarctic spring: use of tracers to determine chemical change**, *Journal of geophysical research*, Sep. 20, 1997, 102(D17), p.21,479-21,491, 38 refs.

Observations of  $\text{O}_3$ ,  $\text{HCl}$ ,  $\text{NO}$ , and  $\text{NO}_2$  from the Halogen Occultation Experiment (HALOE) provide a means to investigate chemical change in the lower stratosphere over Antarctica during Oct. 1992. Two long-lived species are used as tracers to identify a series of air parcels having similar chemical composition. The set of parcels chosen using tracer analysis show uniformly low  $\text{O}_3$  mixing ratios. The repartitioning of the active chlorine family in favor of  $\text{HCl}$  halts the processes that destroy ozone and



makes available active nitrogen in the form of NO and NO<sub>2</sub>. The investigation confirms earlier results and validates tracer analysis as a reliable method to probe chemical change in the stratosphere. (Auth. mod.)

**I-58131**

Kokin, G.A., **Time variations of total ozone over the Molodezhnaya observatory (Antarctica)**, *Russian meteorology and hydrology*, 1996, No.7, p.33-40, Translated from *Meteorologiya i gidrologiya*. 10 refs.

The mean values of total ozone (TO), pressure, and temperature at the Molodezhnaya observatory, are calculated for Sep. and Oct. from 1987 through 1993. Reliable regression relationships are shown to exist between mean values of TO, equatorial zonal wind speed in the 15-10 hPa layer, pressure at 30 km, temperature at 20 km, and the index of geomagnetic activity. Multiple regressions are calculated. These regressions yield the linear trend of TO over the Molodezhnaya observatory for the indicated period to be 0.4% per year. (Auth. mod.)

**I-58132**

Ye, H.C., Mather, J.R., **Polar snow cover changes and global warming**, *International journal of climatology*, Feb. 1997, 17(2), p.155-162, 17 refs.

A study of both current and double CO<sub>2</sub> temperature and precipitation data for all land areas poleward of 60° latitude using three different general circulation models suggests possible changes in snow accumulation due to increasing CO<sub>2</sub>. Increased snow accumulation will occur in the Antarctic whereas a small decrease in snow depth is to be expected in the Northern Hemisphere. Total snow accumulation for all land areas poleward of latitude 60° is found to increase under a double CO<sub>2</sub> scenario. (Auth. mod.)

**I-58139**

Inagawa, Y., Yamamoto, Y., Taguchi, Y., Abo, T., Ijima, O., **Meteorological observations at Syowa Station in 1994 by the 35th Japanese Antarctic Research Expedition**, *Antarctic record*, July 1997, 41(2), p.549-588, In Japanese with English summary. 5 refs.

This paper describes the results of meteorological observations carried out by JARE-35 from Feb. 1, 1994 to Jan. 31, 1995 at Showa Station. The method of observations, instruments, and statistics are discussed. Blizzards occurred 28 times, spanning sixty days. The lowest value of daily representative total ozone was 134 m atm-cm, on Sep. 27, which was the lowest value ever recorded at Showa Station. (Auth. mod.)

**I-58144**

Monastersky, R., **Antarctic ozone expands in altitude**, *Science news*, Oct. 25, 1997, 152(17), p.262.

The author gives an update on the state of the ozone hole over Antarctica as of Oct. 1997, based on conversations with David Hoffmann, a scientist at NOAA's Boulder, CO office. The destroyed ozone reached 20 km for the first time, according to balloon flight measurements in early Oct. Meanwhile, Paul Newman at NASA's Maryland facility confirmed the measurements and expressed optimism that this may be the beginning of the recovery of Antarctica's ozone over the next 15-20 years, if the top starts coming down.

**I-58149**

Rundle, A.S., DeWitt, S.R., **Glaciology and meteorology of Anvers Island. Volume 2. Surface meteorological data for Palmer Station, Antarctica, January 1-December 31, 1966**, Columbus, Ohio State University, Research Foundation, June 1968, 404p., Prepared for the U.S. National Science Foundation.

This report presents in tabular form, the results of surface meteorological observations at Palmer Station, Jan. 1-Dec. 31, 1966. The tabulated data consist of the hourly wind speed, quarter hourly wind direction, hourly air temperature, and hourly atmospheric pressure for each day. The data also include the average wind speed, mean wind direction, and fastest hour, the maximum, minimum, and mean temperature, and the maximum, minimum, and mean pressure for each day.

**I-58156**

Tisdale, R.T., Middlebrook, A.M., Prenni, A.J., Tolbert, M.A.,

**Crystallization kinetics of HNO<sub>3</sub>/H<sub>2</sub>O films representative of polar stratospheric clouds**, *Journal of physical chemistry A*, Mar. 13, 1997, 101(11), p.2112-2119, 48 refs.

The crystallization of binary HNO<sub>3</sub>/H<sub>2</sub>O aerosols may be an important step in the formation of type Ia polar stratospheric clouds. Fourier transform infrared (FTIR) spectroscopy is used to probe the crystallization kinetics of supercooled H<sub>2</sub>O:HNO<sub>3</sub> films to nitric acid dihydrate (NAD) and trihydrate (NAT), respectively. Homogeneous nucleation calculations were performed using the temperature-dependent activation energies in conjunction with previous measurements of aerosol nucleation rates at 190-202 K to determine the freezing rates for HNO<sub>3</sub>/H<sub>2</sub>O particles over a wide temperature range. These calculations indicate that nucleation of NAD from supercooled 2:1 H<sub>2</sub>O:HNO<sub>3</sub> aerosols is rapid at relevant stratospheric temperatures. (Auth. mod.)

**I-58157**

Foster, K.L., Tolbert, M.A., George, S.M., **Interaction of HCl with ice: investigation of the predicted trihydrate, hexahydrate, and monolayer regimes**, *Journal of physical chemistry A*, July 3, 1997, 101(27), p.4979-4986, 46 refs.

Knowledge of the interaction of hydrogen chloride (HCl) with ice is important for an understanding of heterogeneous reactions on polar stratospheric clouds. The interaction of HCl with ice as a function of ice temperature, HCl partial pressure, and ice film thickness was studied using laser-induced thermal desorption (LITD) techniques. Ice films were prepared by depositing H<sub>2</sub>O vapor onto a cooled Al<sub>2</sub>O<sub>3</sub> substrate. The ice was then exposed to HCl partial pressures at ice temperatures from 140 to 186 K. HCl uptake by ice was monitored as a function of time using the HCl LITD signals. At stratospheric temperatures between 180 and 186 K, HCl uptake on ice varied from 4 X 10<sup>14</sup> to 2 x 10<sup>16</sup> molecules/cm<sup>2</sup>, a variation attributed to varying ice surface roughness. HCl uptake was limited to ca. 1 ML on the smoothest ice films, in agreement with previous estimates of monolayer HCl uptake by stratospheric ice. (Auth. mod.)

**I-58158**

Fairbrother, D.H., Sullivan, D.J.D., Johnston, H.S., **Global thermodynamic atmospheric modeling: search for new heterogeneous reactions**, *Journal of physical chemistry A*, Oct. 2, 1997, 101(40), p.7350-7358, 23 refs.

This article demonstrates quantitatively how far reactions are from chemical equilibrium over the full space of a two-dimensional atmospheric model. One purpose of this study is to seek additional stratospheric or tropospheric gas-phase chemical reactions that might undergo heterogeneous catalysis. If a reaction is interesting, is slow in the gas phase, and has a high thermodynamic tendency to react, it is a good candidate for a laboratory study to seek a heterogeneous catalyst. Four heterogeneous reactions important in causing the antarctic "ozone hole" have high thermodynamic tendencies to occur under atmospheric conditions, but one of these is only weakly thermodynamically allowed in some regions of the atmosphere. The reaction of SO<sub>2</sub> and HNO<sub>3</sub> to form HONO has a high thermodynamic potential to occur, is a well-known laboratory reaction at ice temperature, and may occur in nitric acid-rich sulfate aerosols. (Auth. mod.)

**I-58159**

DeFelice, T.P., Saxena, V.K., Yu, S.C., **On the measurements of cloud condensation nuclei at Palmer Station, Antarctica**, *Atmospheric environment*, Dec. 1997, 31(23), p.4039-4044, 16 refs.

CCN (cloud condensation nuclei) spectral measurements are especially rare in the antarctic region. This paper presents and discusses the predominant characteristics associated with a first dataset of daily daylight period averaged CCN spectral measurements at a remote region of the globe, namely Palmer Station. Daily daylight period averages are chosen since the day is dominated by daylight during the sampling period and the CCN measurement frequency is a maximum during the daylight period. (Auth. mod.)

**I-58175**

Zou, H., Gao, Y.Q., **Long-term variations in TOMS ozone over 60-70°S**, *Geophysical research letters*, Sep. 15, 1997, 24(18), p.2295-2298, 19 refs.



This article discusses the long-term variations, seasonal cycle, trends, Quasi-biennial Oscillation and El Niño-Southern Oscillation in total ozone over 60-70°S latitude zone, using data from the Total Ozone Mapping Spectrometer on Nimbus 7 (version 7). The study is focused on the zonal distribution of the above long-term variations in this latitude zone. Recognizably different characteristics are revealed in the ozone variations over West Antarctica from those over East Antarctica. The discussion of these differences notes the possible impact of the land-sea contrast in West Antarctica on the ozone variations. (Auth.)

#### I-58176

Tuck, A., **Chemistry of stratospheric ozone depletion, HPAC—heating/piping/air conditioning**, Jan. 1997, 69(1), p.111-116, 7 refs.

The Montreal Protocol of 1987 and the Copenhagen Amendment of 1992 have been agreed to and implemented by the nations of the world acting in concert. The amount of chlorine that would destroy ozone in the antarctic vortex and globally is leveling off as a result of these controls, as indicated by the slower growth rates of the injection of halocarbons into the troposphere (halocarbons include chlorine and bromine compounds). Of particular interest to the mechanical engineered systems community are the CFC-11 and CFC-12 growth rates. Within the accuracy of the ability to measure, CFC-11 growth has peaked and may even be in decline, and CFC-12 has peaked. However, because they are long-lived in the atmosphere (approximately 50 and 100 years, for CFC-11 and CFC-12 respectively), the best estimates are that it will take several decades before, for example, the ozone hole disappears. It is vital that there is effective global compliance with the international protocols to ensure that chlorine levels decline in the real atmosphere. (Auth. mod.)

#### I-58195

Miao, J.G., Schlüter, N., Heygster, G., **Retrieval of total water vapor in polar regions using SSM/T2 channels**, International Geoscience and Remote Sensing Symposium, Singapore, Aug. 3-8, 1997. IGARSS'97. Remote sensing—a scientific vision for sustainable development. Vol.1, New York, Institute of Electrical and Electronics Engineers, 1997, p.61-63, 6 refs.

#### DLC QE33.2.R4I57 1997

A method to retrieve the total water vapor in the cloudless atmosphere using SSM/T2 channels is proposed based on a unique property of three contiguous channels situated on the flank of the water vapor absorption line at 183.31 GHz. One of its advantages is its independence to the surface emission, which is the main disturbing factor in retrieving atmospheric parameters from passive satellite measurements. Due to the high sensitivity of the SSM/T2 channels to water vapor, this method is suitable to the total water vapor retrieval for dry polar atmospheres. An algorithm is constructed for austral winter cases through model simulation using radiosonde profiles. (Auth.)

#### I-58201

Comiso, J.C., Stock, L., **Antarctic surface temperatures using satellite infrared data from 1979 through 1995**, International Geoscience and Remote Sensing Symposium, Singapore, Aug. 3-8, 1997. IGARSS'97. Remote sensing—a scientific vision for sustainable development. Vol.3, New York, Institute of Electrical and Electronics Engineers, 1997, p.1300-1304, 11 refs.

#### DLC QE33.2.R4I57 1997

The large scale spatial and temporal variations of surface ice temperature over the antarctic region are studied using infrared data derived from the Nimbus-7 Temperature Humidity Infrared Radiometer (THIR) from 1979 through 1985 and from the NOAA Advanced Very High Resolution Radiometer (AVHRR) from 1984 through 1995. Enhanced techniques suitable for the polar regions for cloud masking and atmospheric correction were used before converting radiances to surface temperatures. The observed spatial distribution of surface temperature is highly correlated with surface ice sheet topography and agrees well with ice station temperatures with 2K to 4K standard deviations. The average surface ice temperature over the entire continent fluctuates by about 30K from summer to winter while that over the antarctic plateau varies by about 45K. Interannual fluctuations of the coldest temperatures are observed to be as large as

15K. Despite large temporal variability, a regression analysis shows no apparent trend in temperature during the period 1979 through 1995. (Auth. mod.)

#### I-58208

Yudin, V.A., et al, **UARS study of lower stratospheric polar processing in the early stages of northern and southern winters**, *Journal of geophysical research*, Aug. 20, 1997, 102(D15), p.19,137-19,148, 44 refs.

UARS data and results from a three-dimensional transport model have been used to compare and contrast the extent of the early stages of chemical processing by polar stratospheric clouds (PSCs) during the 1991-1993 Northern and Southern Hemisphere winters of the Upper Atmosphere Research Satellite (UARS) mission. In the Southern Hemisphere, polar processing fills the vortex in a bit over 2 weeks. Estimates of the spectral aerosol measure of the aerosol spectrum from CLAES observations illustrate that PSC particles are seen where cold temperatures occur inside the polar vortex and heterogeneous conversion of chlorine species on PSCs are expected. (Auth. mod.)

#### I-58209

Mergenthaler, J.L., Kumer, J.B., Roche, A.E., Massie, S.T., **Distribution of antarctic polar stratospheric clouds as seen by the CLAES experiment**, *Journal of geophysical research*, Aug. 20, 1997, 102(D15), p.19,161-19,170, 41 refs.

The distribution and optical characteristics of antarctic polar stratospheric clouds (PSCs) during the winter of 1992 as seen from the cryogenic limb array etalon spectrometer (CLAES) on the NASA Upper Atmosphere Research Satellite (UARS) are presented. An analysis of the vertical and areal distribution using the aerosol absorption coefficient is presented, including a polar map showing the frequency of PSC occurrence during the two CLAES antarctic viewing periods. The PSC seasonal evolution from CLAES is compared with a climatology based on the Stratospheric Aerosol Measurements II (SAM II) system. (Auth. mod.)

#### I-58210

Makshtas, A.P., Timachev, V.F., Zachek, A.S., **Processes of air-sea interaction in polar regions**, ACSYS Conference on the Dynamics of the Arctic Climate System, Göteborg, Sweden, Nov. 7-10, 1994. Proceedings. Edited by P. Lemke, L. Anderson, R. Barry, and V. Vuglinskii, Geneva, Switzerland, World Meteorological Organization, 1996, p.48-53, 19 refs.

The authors consider some questions from a previous review of the results of full-scale experiments, carried out in the early 1950s in the Arctic and the Antarctic. Results show the following: the aerosol component has an important role in the formation of the long-wave radiation balance of sea ice cover surface, which governs the increase of incoming long-wave radiation by 10-20%; the stratification effects of the near-ice air layer must be taken into account to describe turbulent energy exchange in the uniform zones of the sea ice cover; the most important improvement of the ice cover models is the parameterization of the melting of hummocks and formation of puddles, occupying up to 30% of the ice cover surface and radically enhancing the processes of its decay; and the heat flux from the ocean to the bottom of the ice has a well-pronounced spatial variability. (Auth. mod.)

#### I-58211

Krueger, A.J., **Ultraviolet remote sensing technology**, Global environmental change: the role of space in understanding Earth. 27th Goddard Memorial Symposium: Proceedings of a conference held Mar. 8-10, 1989, Washington, D.C. Edited by R.G. Johnson and Science and technology series, vol.76: A Supplement to Advances in the Astronautical Sciences, San Diego, CA, Univelt, Inc., 1990, p.123-130, Abridged version of the paper, some illustrations were not available.

#### DLC GE180.G63 1989

The Nimbus 7 satellite's Total Ozone Mapping Spectrometer (TOMS) has obtained images of the antarctic ozone hole, and demonstrated that volcanic eruptions can be unambiguously detected from space in view of the absorption of the plumes' sulfur dioxide. While the TOMS currently has an average spatial resolution of 66 km and a 24-hr temporal resolution,



total ozone features at mid-latitudes change within time-scales of hours and may involve structural features as small as 15-25 km. It is projected that these observational requirements are achievable with TOMS-like instruments in GEO, using CCD detector arrays in place of mechanical scanning.

#### I-58254

Graham, J.D., Roberts, J.T., **Formation of  $\text{HCl}\cdot 6\text{H}_2\text{O}$  from ice and HCl under ultrahigh vacuum, *Chemometrics and intelligent laboratory systems*, 1997, Vol.37, p.139-148, 25 refs.**

Chemical reactions that occur in the surface and near surface regions of ice and related particles in polar stratospheric clouds are believed to participate in the sequence of events that ultimately opens the antarctic ozone hole. The interactions of hydrogen chloride (HCl) with ultrathin (10-100 monolayers thick) films of ice between 120 and 180 K were studied using temperature programmed desorption and Fourier transform infrared reflection absorption spectroscopy. HCl is initially absorbed by ice at 120 K to form the stoichiometrically fixed hexahydrate phase,  $\text{HCl}\cdot 6\text{H}_2\text{O}$ . Infrared spectroscopic measurements suggest that the hexahydrate is present as an amorphous solid. Upon the conversion of ice to  $\text{HCl}\cdot 6\text{H}_2\text{O}$ , HCl is adsorbed to the thin film surface, possibly with the H-Cl bond intact. (Auth. mod.)

#### I-58257

Figuerola, F.L., Blanco, J.M., Jiménez-Gómez, F., Rodríguez, J., **Effects of ultraviolet radiation on carbon fixation in antarctic nanophytoflagellates, *Photochemistry and photobiology*, Aug. 1997, 66(2), p.185-189, 29 refs.**

Carbon fixation in antarctic nanoflagellates dominated by cryptomonads collected during a summer cruise in 1995 decreased after short-term exposure under both UVA and UVA+UVB radiation compared to white light. Dosage applied with artificial lamps was within the range of the natural UV radiation measured at the surface during the cruise. Depletion of C fixation was higher after UVA+UVB than after UVA alone. The inhibition of carbon fixation in the laboratory depended on the time of sample collection and on the UV dose received in the natural environment before sampling. Cells collected in the morning showed 82% of inhibition by UVA+UVB but those collected at noon showed only 72%. The same effect was observed by UVA: 72% of inhibition in the morning samples and 62% at noon. Photoprotection mechanisms seem to operate during the day protecting the cells against a rise in UV radiation. Red fluorescence per cell, as determined by flow cytometry, was not affected by UV; however, orange fluorescence increased clearly after UV radiation compared to that in white light. The increment of orange fluorescence was higher after UVA than after UVA+UVB radiation. (Auth. mod.)

#### I-58264

De Wolde, J.R., Huybrechts, P., Oerlemans, J., Van de Wal, R.S.W., **Projections of global mean sea level rise calculated with a 2D energy-balance climate model and dynamic ice sheet models, *Tellus*, Aug. 1997, 49A(4), p.486-502, 26 refs.**

Projections of changes in surface air temperature and global mean sea level over the next century are presented for all IS92 radiative forcing scenarios. A zonal mean energy-balance climate model is used to estimate temperature changes and thermal expansion, precipitation-dependent sensitivity values are used to estimate the sea-level contribution of glaciers and small ice caps and dynamic ice-sheet models coupled to surface mass balance models are employed with regard to the Greenland and antarctic ice sheets. The largest inter-model differences in individual sea-level contributions are found for thermal expansion and for the antarctic ice-sheet. It is concluded that the inter-model differences in sea-level projections are caused by the use of essentially different models in this paper and in the revised IPCC96 projections. (Auth. mod.)

#### I-58275

Smith, R.C., Stammerjohn, S.E., Baker, K.S., **Surface air temperature variations in the western Antarctic Peninsula region, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.105-121, Refs. p.120-121.**

DLC QH541.264.A6F67 1996

Surface air temperature records from several western Antarctic Peninsula (WAP) stations are examined. The annual progression of surface air temperatures show an along-peninsula gradient indicative of contrasting influences of maritime versus continental climate regimes. WAP temperature records also show a significant warming trend in mid-winter temperatures, with an increase of 4-5°C between 1944 and 1991. Increased temperature variability in fall and winter is linked to the high interannual variability of sea ice coverage. Linear regression analysis shows a significant (99.9%) anticorrelation between air temperature and sea ice extent. The more than 45 year Faraday air temperature record shows significant low frequency coherence with the Southern Oscillation Index (SOI). In addition, high frequency coherences between WAP air temperatures, WAP sea ice extent and SOI support the hypothesis that not only do extreme SOI events affect WAP climate, but monthly SOI fluctuations may be affecting monthly fluctuations in WAP air temperatures and sea ice extent as well. (Auth. mod.)

#### I-58320

Sreedharan, C.R., Sudhakar Rao, G., Gulhane, P.M., **Ozone measurement from Dakshin Gangotri, Antarctica, during 1988-89, *Indian journal of radio & space physics*, Dec. 1989, 18(5/6), p.188-193, 17 refs.**

DLC QC801.I42

Results of 28 balloon soundings monitoring changes in ozone profiles in 1988 over the Dakshin Gangotri Station are presented. These were supplemented by Dobson spectrophotometer measurements from the same station. Sep./Oct. 1988 depletions have been found to be much less pronounced than those occurred during similar period in 1987. Significantly, the stratosphere over Dakshin Gangotri was also not as cold as in 1987. (Auth. mod.)

#### I-58321

Parkinson, M.L., Monselesan, D.P., Smith, P.R., Dyson, P.L., Morris, R.J., **Digital ionosonde measurements of the height variation of drift velocity in the southern polar cap ionosphere: initial results, *Journal of geophysical research*, Nov. 1, 1997, 102(A11), p.24,075-24,090, 28 refs.**

During the late austral summer of 1995-1996 the authors operated an HF digital ionosonde at Casey Station in an experimental drift mode with the aim of resolving the height variation of drift velocity in the polar cap ionosphere. They devised control programs for a Digisonde Portable Sounder 4 to collect data at separate frequency-range gates corresponding to the E and F regions to investigate the differences in their motions. Initial results of the program are reported and discussed. (Auth. mod.)

#### I-58348

Stanhill, G., Cohen, S., **Recent changes in solar irradiance in Antarctica, *Journal of climate*, Aug. 1997, 10(8), p.2078-2086, 49 refs.**

A significant decrease in the annual sums of global irradiance reaching the surface in Antarctica was derived from an analysis of all complete years of measurement available from 12 pyranometer stations, 10 of which were on the coast. The decrease was greater than could be attributed to the nonhomogeneous nature of the database, the estimated errors of measurement, or changes in the amount of cloud cover. The smaller database of radiation balance measurements available showed no statistically significant change. Possible causes of these results are discussed, as is the implication that the recent surface warming in Antarctica is not due to radiative forcing. (Auth. mod.)

#### I-58356

Tie, X.X., Granier, C., Randel, W., Brasseur, G.P., **Effects of interannual variation of temperature on heterogeneous reactions and stratospheric ozone, *Journal of geophysical research*, Oct. 20, 1997, 102(D19), p.23,519-23,527, 39 refs.**

A two-dimensional chemical/dynamical/microphysical model is used to calculate the effect of temperature interannual variability on stratospheric ozone. Two effects associated with temperature variations are considered: the effect on the rate coefficient of heterogeneous reactions occurring at the surface of sulfate aerosols, and the effect of temperature interannual variations on the formation of polar stratospheric clouds (PSCs) and the spring antarctic ozone depletion. The model results also



show that during winters 1986 to 1990, the formation of PSCs over Antarctica exhibits a strong interannual variation, due to temperature variability. The interannual variation of the formation of PSCs likely plays an important role for the interannual variability of the spring antarctic ozone hole. (Auth. mod.)

### I-58357

Randeniya, L.K., Vohralik, P.F., Plumb, I.C., Ryan, K.R., **Heterogeneous BrONO<sub>2</sub> hydrolysis: effect on NO<sub>2</sub> columns and ozone at high latitudes in summer**, *Journal of geophysical research*, Oct. 20, 1997, 102(D19), p.23,543-23,557, 40 refs.

Laboratory measurements have shown that BrONO<sub>2</sub> + H<sub>2</sub>O<sub>aerosol</sub> → HOBR + HNO<sub>3</sub> (reaction (3)) has the potential to cause re-partitioning of ozone-depleting species. In this work, two-dimensional calculations show clearly that the impact of (3) is greatest for high aerosol levels and for high latitudes in summer. The calculations have been used to determine the effects of increased aerosol loading on calculated NO<sub>2</sub> columns in the Antarctic during summer and autumn of 1990, 1991, 1992 and 1993. It is shown that (3) could be responsible for reductions in NO<sub>2</sub> columns during polar day comparable to those measured in 1992 and 1993 following the eruption of Mount Pinatubo. (Auth. mod.)

### I-58358

Rusch, D.W., et al, **Validation of POAM ozone measurements with coincident MLS, HALOE, and SAGE II observations**, *Journal of geophysical research*, Oct. 20, 1997, 102(D19), p.23,615-23,627, 13 refs.

Ozone measurements from the Polar Ozone and Aerosol Measurement (POAM) experiment launched in Sep. 1993 are compared with those from the Microwave Limb Sounder (MLS), the Halogen Occultation Experiment (HALOE), and the Stratosphere Aerosol and Gas Experiment II (SAGE II) for both arctic and antarctic atmospheres. The accuracy of the POAM ozone measurements is demonstrated by comparing zonal means and standard deviations of the three data sets. The large number of comparisons with satellite instruments demonstrate that the POAM ozone data are valid within the instrumental errors and that the precision and accuracy of the data are adequate for scientific investigation and interpretation. (Auth. mod.)

### I-58359

Bevilacqua, R.M., et al, **POAM II ozone observations in the antarctic ozone hole in 1994, 1995, and 1996**, *Journal of geophysical research*, Oct. 20, 1997, 102(D19), p.23,643-23,657, 40 refs.

The authors present an overview of Polar Ozone and Aerosol Measurement (POAM) II satellite-based observations of ozone in the antarctic ozone hole in 1994, 1995, and 1996. The POAM II observations are consistent with previous observations suggesting that ozone loss in the ozone hole is confined to the polar vortex. The timing of ozone loss and recovery was similar in each year. Ozone concentrations begin to decrease in July, and the period of largest depletion observed by POAM II occurs between early Sep. and early Oct., when the observations are obtained at high southern latitudes near the vortex center. The POAM II observations show that in late spring, after the ozone hole chemical processing has been completed, ozone mixing ratios are lower inside the antarctic vortex (relative to outside the vortex) at all levels between at least 450 K and 1500 K, presumably resulting from a combination of dynamical and chemical effects. (Auth. mod.)

### I-58360

Fromm, M.D., et al, **Observations of antarctic polar stratospheric clouds by POAM II: 1994-1996**, *Journal of geophysical research*, Oct. 20, 1997, 102(D19), p.23,659-23,672, 27 refs.

The Polar Ozone and Aerosol Measurement (POAM) II solar occultation instrument has made extensive measurements of polar stratospheric clouds (PSCs) since launch in Sep. 1993. The cloud detection algorithm used to identify PSCs from POAM II measurements is described. In May, PSCs are observed at an average altitude of 24 km, with the altitudes moving downward as the altitude of the coldest air descends within the polar vortex during the winter. (Auth. mod.)

A-58164 B-56371 B-56510 B-56551 B-56580 B-56629 B-56649  
B-56650 B-56757 B-56763 B-56860 B-56971 B-57037 B-57075  
B-57098 B-57223 B-57325 B-57440 B-57685 B-57737 B-57800  
B-57805 B-57808 B-57902 B-57966 B-58047 B-58054 B-58110  
B-58228 E-56348 E-56415 E-56416 E-56693 E-56856 E-56885  
E-57349 E-57383 E-57743 E-57766 E-57781 E-57996 E-58100  
F-56382 F-56383 F-56425 F-56434 F-56461 F-56464 F-56489  
F-56565 F-56581 F-56690 F-56720 F-56812 F-56813 F-56814  
F-56833 F-56837 F-56839 F-56845 F-56964 F-56966 F-56993  
F-56995 F-57085 F-57097 F-57122 F-57171 F-57177 F-57212  
F-57335 F-57341 F-57345 F-57367 F-57369 F-57370 F-57382  
F-57441 F-57474 F-57476 F-57512 F-57529 F-57556 F-57605  
F-57656 F-57657 F-57705 F-57741 F-57796 F-57873 F-57875  
F-57877 F-57887 F-57903 F-57965 F-58026 F-58030 F-58032  
F-58034 F-58129 F-58162 F-58166 F-58182 F-58194 F-58196  
F-58197 F-58202 F-58204 F-58205 F-58334 F-58347 G-56396  
G-56578 G-56625 G-56648 J-56393 J-56772 J-56773 J-57006  
J-57030 J-57051 J-57186 J-57368 J-57407 J-57421 J-57527  
J-57568 J-57802 J-58023 J-58088 J-58143 J-58185 K-56402  
K-56406 K-57248 K-57252 K-57310 K-57778 K-57934 K-58112  
L-56982

See also:

A-56525 A-56559 A-56967 A-57487 A-57525 A-57537 A-58163



## J. OCEANOGRAPHY

### J-56359

Weis, D., Frey, F.A., **Role of the Kerguelen Plume in generating the eastern Indian Ocean seafloor**, *Journal of geophysical research*, June 10, 1996, 101(B6), p.13,831-13,849, 81 refs.

Mid-ocean ridge basalts (MORB) in the Indian Ocean have Sr-Nd-Pb isotopic characteristics that distinguish them from seafloor basalts in the Atlantic and Pacific Oceans. These differences have important implications for mantle dynamics. Discussed is the isotopic variation with eruption age of seafloor basalts recovered by deep sea drilling at 10 sites in the eastern Indian Ocean ranging in age from Eocene to Late Jurassic. Except for alkalic basalts recovered from near Christmas I. in the northeast Indian Ocean, the basement lavas are tholeiitic basalts that are characterized by a wide range in incompatible element abundance ratios, such as La/Yb and Zr/Nb. Most of the tholeiitic basalts from seven sites are geochemically similar to recent Indian Ocean MORB, but the alkalic basalts and tholeiitic lavas from two other sites have isotopic and incompatible element abundance ratios similar to lavas associated with the Kerguelen Plume. Two of these three sites, however, are not close to the track of this plume. The Dupal isotopic signature (relatively high  $^{87}\text{Sr}/^{86}\text{Sr}$  and high  $^{208}\text{Pb}/^{204}\text{Pb}$  at a given  $^{206}\text{Pb}/^{204}\text{Pb}$ ) is characteristic of lavas that have been attributed to the Kerguelen Plume, i.e., the Kerguelen Archipelago, Ninetyeast Ridge, and Kerguelen Plateau. (Auth. mod.)

### J-56380

Fuoco, R., Colombini, M.P., Ceccarini, A., Abete, C., **Polychlorobiphenyls in Antarctica**, *Microchemical journal*, Nov. 1996, 54(4), p.384-390, 10 refs.

The presence and the distribution of polychlorobiphenyls (PCBs) in antarctic environmental components and the effect of the seasonal formation/melting process of pack ice on the pollution level of seawater were investigated. Seawater, marine, and lake sediment and soil samples were collected in a large area of the Ross Sea and Victoria Land during the 1988-1992 Italian expeditions. The results obtained highlighted a low and quite homogeneous PCB contamination of the studied area. Surface seawater samples from Gerlache Inlet and Wood Bay showed a typical PCB concentration of 130 pg/l, and an increase after pack ice melting of about 30-40%. (Auth. mod.)

### J-56393

Palowitch, A.W., **Acoustic travel time thermometer for global warming**, MTS '91, New Orleans, LA, Nov. 10-14, 1991. Proceedings. An ocean cooperative: industry, government and academia. Vol.1, Washington, D.C., Marine Technology Society, 1991, p.611-617, 10 refs.

### DLC GC2.M78 1991

The topic of global warming has lately received much attention, most of which has been theoretical conjecture and computer modeling of probable warming rates and resulting effects. In an effort to actually determine the existence of a global trend, a program was organized by the National Science Foundation and the Office of Naval Research to measure ocean temperature changes as a function of acoustic travel times across ocean basins. In Jan. 1991 the Heard Island Feasibility Test was conducted to help determine the direction for a ten-year temperature monitoring effort. In the test, transmission from a submerged acoustic 57 hz source were received by towed, vertical and horizontal arrays at numerous stations in the world's oceans. Travel times between the source and receivers were used to determine the mean temperature along the acoustic paths. Technical results from the feasibility test are presented along with details on the commencement of the ten-year program for the monitoring of the global climate. (Auth.)

### J-56412

Gent, P.R., McWilliams, J.C., **Eliassen-Palm fluxes and the momentum equation in non-eddy-resolving ocean circulation models**, *Journal of physical oceanography*, Nov. 1996, 26(11),

p.2539-2546, 35 refs.

The concepts of residual-mean circulation, transformed Eulerian-mean equations, and Eliassen-Palm fluxes are generalized. The eddy motions being considered are ocean eddies on short time and small space scales rather than either purely transient eddies or steady, zonally averaged, standing eddies as commonly considered for the atmosphere. The generalized Eliassen-Palm fluxes are parameterized as downgradient momentum diffusion plus the appropriate Coriolis term. This gives a momentum equation for use in non-eddy-resolving ocean circulation models. The resulting potential vorticity equation is then analyzed and the quasigeostrophic limit taken. A discussion of the Antarctic Circumpolar Current and the meridional-plane circulation, the Deacon cell, in the Southern Hemisphere ocean follows. (Auth. mod.)

### J-56439

Smithson, M.J., Robinson, A.V., Flather, R.A., **Ocean tides under the Filchner-Ronne Ice Shelf, Antarctica**, *Annals of glaciology*, 1996, Vol.23, International Symposium on Ice Sheet Modelling, Chamonix, France, Sep. 18-22, 1995. Papers. Edited by K. Hutter, p.217-225, 21 refs.

A depth-averaged finite-difference numerical model has been used to make a preliminary study of the tides under the Filchner-Ronne Ice Shelf. Open boundary conditions were specified using the global ocean model of Schwiderski. Tidal constituents for the two principal semi-diurnal constituents  $M_2$  and  $S_2$ , and the two principal diurnal constituents  $O_1$  and  $K_1$  were extracted from computed sea-surface elevations by harmonic analysis. Measured values near to the grounding line could only be reproduced satisfactorily by increasing the bottom friction coefficient under the ice to 50 times the open-ocean value. This destroys any agreement near the ice front or at pelagic sites. It is thought that a friction coefficient which varies with distance under the ice would be able to reproduce better all the available measurements. More tidal measurements are required to validate any model of the region with model experiments being used to help pinpoint possible sites for instrument deployment. (Auth.)

### J-56484

Verlencar, X.N., Parulekar, A.H., **Nutrients and phytoplankton production in the southern ocean in a section 10° to 52°E in the Indian Ocean**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.159-167, Refs. p.166-167.

### DLC G850.I53I53 1984

Chlorophyll *a* (Chl *a*), primary productivity (PP) and nutrients in the coastal and offshore waters of Antarctica have been studied. Distribution of chl *a* and PP suggests that coastal waters are more productive than the offshore oceanic waters. The particulate oxidizable carbon (POC) concentrations in the coastal and oceanic waters were high and varied from 0.26 to 3.11 mg/m. In the surface water nitrate and phosphate values south of the Antarctic Convergence were high. High Si values of  $>28 \mu\text{mol d/m}^3$  were observed south of latitude 50°S. These decreased to  $>6 \mu\text{mol d/m}^3$  northward. Urea and ammonia concentrations in antarctic waters occur in significant proportions. Concentrations of total nitrogen (TN) and dissolved organic phosphorus (DOP) were also high. A sharp decrease in Si from the Antarctic Divergence up to Subtropical Convergence indicates a higher demand of this nutrient by the antarctic marine diatoms. (Auth. mod.)

### J-56499

Crame, J.A., Lomas, S.A., Pirrie, D., Luther, A., **Late Cretaceous extinction patterns in Antarctica**, *Journal of the Geological Society, London*, July 1994, 153(4), p.503-506, 25 refs.

New correlations of marine clastic sedimentary rocks exposed within the James Ross Basin have shown that the mid- to late Cretaceous succession is in excess of 5 km thick. Plotting the ranges of the principal mollus-



can macrofossils against the revised stratigraphy indicates that inoceramid bivalves are totally absent, and dimitobelid belemnites extremely rare, throughout an extensive 1400 m thick Maastrichtian succession. These early extinction patterns are interpreted to be due to both a regional shallowing event and a pronounced phase of high-latitude, Campanian-Maastrichtian cooling. Cool polar bottom waters may have been forming by as early as mid- to late Campanian times. (Auth.)

#### J-56528

Smith, S.D.A., Simpson, R.D., **Effects of the 'Nella Dan' oil spill on the fauna of *Durvillaea antarctica* holdfasts**, *Marine ecology progress series*, May 25, 1995, 121(1-3), p.73-89, 68 refs.

The effects of a small spill of light marine diesel on the community structure of invertebrates inhabiting *Durvillaea antarctica* holdfasts were examined for samples taken from sites which received heavy, moderate and no oiling at Macquarie I. Holdfasts from oiled sites were characterized by heavy sediment loads, a dominance of capitellid, cirratulid and spionid polychaetes and the rarity of the isopod *Limnoria stephenseni*. In contrast, samples from the control sites were dominated by peracarid crustaceans and in particular by the herbivorous isopod *L. stephenseni*. Analysis of differences in the size distribution patterns of the 4 most common species suggests that impacts occurred across all sizes for *L. stephenseni* and *P. kidderi*. At the heavily oiled sites, size distribution patterns for the gastropod *L. caliginosa* were skewed towards larger individuals, suggesting a differential mortality of smaller individuals. The authors suggest that the rarity of *L. stephenseni* at the oiled sites may result in the accumulation of sediment within the internal chambers of the holdfast, producing a habitat more suitable for polychaete worms. The residual levels of hydrocarbons within these sediments may further restrict the polychaete species to opportunistic taxa which were not found at the control sites. Further sampling of the sites is needed to resolve some of several uncertainties which still exist. (Auth. mod.)

#### J-56541

Ram, M.J., **Primary productivity, phytoplankton standing crop and physico-chemical characteristics of the Antarctic and adjacent central Indian Ocean waters**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.115-132, Refs. p.130-132.

Primary productivity, phytoplankton pigments and physico-chemical properties were studied in antarctic waters and adjoining Indian Ocean from Jan. 4 to Mar. 23, 1990. Fairly higher values of standing crop and column production in the coastal ice-edge zone (av. 179.39 mg/m<sup>3</sup> & 15.8 mg/m<sup>2</sup>/h) than that of antarctic oceanic region (49.25 mg/m<sup>3</sup> & 1.92 mg C/m<sup>2</sup>/h) suggested the coastal ice-edge zone to be far more productive. Low values (0.003-0.009 mg C/[mg chl-*a*]/h) of assimilation number (AN) or photosynthetic rate and high concentration of phaeophytin (av. 12.35-23.50 mg/m<sup>3</sup>) recorded in floating ice samples indicated unhealthy phytoplankton cells frozen in the ice. (Auth. mod.)

#### J-56661

Whitehouse, M.J., Priddle, J., Symon, C., **Seasonal and annual change in seawater temperature, salinity, nutrient and chlorophyll *a* distributions around South Georgia, South Atlantic**, *Deep-sea research I*, Apr. 1996, 43(4), p.425-443, 37 refs.

Data collected between 1926 and 1990, during the *Discovery* Investigations and fourteen subsequent cruises have allowed the description of spatial and temporal variability of temperature, salinity, phosphate, silicate, nitrate and chlorophyll *a* in the surface waters around the subantarctic island of South Georgia. Measurements made in Antarctic Circumpolar Current water were compared with others made in Weddell Sea water, and profiles from shelf, shelf-slope and oceanic sites were considered separately. In summer, Weddell Sea surface water was significantly colder than that of the Antarctic Circumpolar Current, but no changes of temperature corresponded with bathymetry. There were no systematic differences between the salinity measurements made in Weddell Sea surface water and those in Antarctic Circumpolar Current water. Considerable interannual variability was found, with winter-like conditions prevailing until Jan. on some occasions, and apparent year-to-year variability in the timing and magnitude of nutrient utilization (especially silicate) by phytoplankton. A relationship was found between sea surface conditions around South

Georgia in summer and the preceding winter's fast-ice duration at the South Orkney Is., which implied that some of this variability was attributable to large-scale change over the Scotia Sea as a whole, as opposed to local influences. (Auth. mod.)

#### J-56694

Challenor, P.G., Read, J.F., Pollard, R.T., Tokmakian, R.T., **Measuring surface currents in Drake Passage from altimetry and hydrography**, *Journal of physical oceanography*, Dec. 1996, 26(12), p.2748-2759, 24 refs.

This paper describes a new method for combining altimetry data with hydrography in order to produce absolute surface geostrophic currents from altimetry. This method is then applied to data from the Drake Passage allowing surface currents to be monitored every 35 days during the second half of 1992. The resulting currents show several regions of strong currents with water flowing to the east and other places where the currents are either zero or flowing to the west. After comparison with a model it is suggested that this structure is a result of the bathymetry. (Auth. mod.)

#### J-56742

Berdalet, E., Vaqué, D., Arin, L., Estrada, M., Alcaraz, M., Fernández, J.A., **Hydrography and biochemical indicators of microplankton biomass in the Bransfield Strait (Antarctica) during January 1994**, *Polar biology*, Jan. 1997, 17(1), p.31-38, Refs. p.37-38.

The relationships between hydrography and spatial distribution of several biochemical indicators of microplankton biomass (chlorophyll, protein and ATP) were studied in an area covering the eastern part of the Bransfield Strait and the northern part of the Weddell Sea during Jan. 1994. Four hydrographic zones were identified. The highest values of biomass indicators were found in the zones affected by ice-melting processes and in waters from the Bellingshausen Sea. The lowest values of all biochemical parameters were found in the Weddell Sea and in the Weddell-Scotia Confluence waters. A high variability in the hydrographic structure and the distribution of biochemical indicators was observed. The degree of stabilization of the water column, the depth of the upper mixed layer and the grazing pressure of herbivorous zooplankton played a major role in the development, accumulation and spatial variability of microplankton biomass. (Auth. mod.)

#### J-56756

Peter, B.N., **Dicothermal layer characteristics; a case study in the Antarctic zone of the Indian Ocean**, *Indian National Science Academy. Proceedings*, 1993, 59(A5), p.439-447, 5 refs.

#### DLC Q73.I774A 1993

The dicothermal layer from the vertical distribution of temperature, approximately along 10°E and 40°E in the Indian Ocean sector of the Antarctic, has been identified. This layer occupies between 50 and 150 m depth and extends up to about 52°S from the antarctic coast. Some characteristics such as salinity, thermocline anomaly, oxyty and sound velocity in the dicothermal layer have been analyzed and a few significant changes are reported. The sound velocity seems to be minimum along this layer. Below the dicothermal layer, the horizontal variation is probably dominant. (Auth.)

#### J-56772

Ivchenko, V.O., Treguier, A.M., Best, S.E., **Kinetic energy budget and internal instabilities in the Fine Resolution Antarctic Model**, *Journal of physical oceanography*, Jan. 1997, 27(1), p.5-22, 36 refs.

An energy analysis of the Fine Resolution Antarctic Model (FRAM) reveals the instability processes in the model. The main source of time-mean kinetic energy is the wind stress and the main sink is transfer to mean potential energy. The wind forcing thus helps maintain the density structure. Transient motions result from internal instabilities of the flow rather than seasonal variations of the forcing. Baroclinic instability is found to be an important mechanism in FRAM. The highest values of available potential energy are found in the western boundary regions as well as in the Antarctic Circumpolar Current (ACC) region. This friction is required for the numerical stability of the model and can only be made smaller by using a finer horizontal resolution. Barotropic instability is also found to be



important for the total domain balance. The inverse transfer (that is, transfer from eddy to mean kinetic energy) does not occur anywhere, except in very localized tight jets in the ACC. (Auth. mod.)

#### J-56773

Hughes, C.W., Warren, B.A., LaCasce, J.H., Robbins, P.E., **Comments on "On the obscurantist physics of 'form drag' in theorizing about the Circumpolar Current"**, *Journal of physical oceanography*, Jan. 1997, 27(1), p.209-212, 16 refs. Includes reply. For pertinent paper see 51-930 or J-56120.

In a recent note, Warren et al. presented the opinion that considerations of form drag in the dynamics of the Antarctic Circumpolar Current (ACC) are obscurantist in nature and a distraction from the more promising "Sverdrup" approach to ACC dynamics. The present author argues that, on the contrary, the concept of form drag is one of several important considerations in understanding ACC dynamics and is the one that most clearly distinguishes the ACC from midocean gyres. (Auth. mod.)

#### J-56889

Nicholls, K.W., Makinson, K., Johnson, M.R., **New oceanographic data from beneath Ronne Ice Shelf, Antarctica**, *Geophysical research letters*, Jan. 15, 1997, 24(2), p.167-170, 20 refs.

Oceanographic data have been obtained via an access hole made through Ronne Ice Shelf. The site, which is the third in a series of similar studies, lies 17 km west of Korff Ice Rise where 825 m of ice overlies a 485-m deep water column. Measurements included conductivity and temperature profiles, and an instrument mooring was deployed for long-term measurements of currents, temperature and conductivity. At the sea floor there was a 150-m layer of well-mixed water with a potential temperature and salinity of  $-1.97^{\circ}\text{C}$  and 34.72. The water cooled and freshened towards the ice-shelf base, ultimately reaching  $-2.41^{\circ}\text{C}$  and 34.51. The hydrographic and water current data imply a flow into the deepest part of the sub-ice shelf cavity of about  $200,000 \text{ m}^3/\text{s}$  of the deeper, relatively warm water, which would be able to power an average basal melt rate of 0.2 m/a for the western portion of Ronne Ice Shelf. (Auth.)

#### J-56958

Melchior, P., Francis, O., **Comparison of recent ocean tide models using ground-based tidal gravity measurements**, *Marine geodesy*, Oct.-Dec. 1996, 19(4), p.291-330, 34 refs.

The authors compare the periodic gravitational attraction and elastic loading effects calculated with different models to the corresponding effects measured at 289 ground-based tidal gravity stations distributed on all continents and several islands. This may be considered as a test of validity for the ocean tide models. It is shown that these ground-based data clearly detect serious imperfections such as the absence of the Arctic Ocean and of the Weddell and Ross Seas. Such comparisons have their limitations: noise level in tidal gravity observations, distance of the observing stations from the ocean basins, mass conservation, and resolution of the ocean tide models. No model is systematically best for all regions. New observations of gravity tides should be made in the proximity (50 km) of seas with strong tides but of simple coastal geometry (Gulf of Biscaye, Brazil). Severe contradictions remain in some specific areas such as Indonesia, New Zealand, and Patagonia, where the diurnal wave  $O_1$  is of special interest. (Auth. mod.)

#### J-56977

Levine, M.D., Padman, L., Muench, R.D., Morison, J.H., **Internal waves and tides in the western Weddell Sea: observations from Ice Station Weddell**, *Journal of geophysical research*, Jan. 15, 1997, 102(C1), p.1073-1089, 59 refs.

The upper ocean current and temperature fields in the western Weddell Sea were measured from the drifting pack ice at Ice Station Weddell I (ISW) and nearby sites. These data document the structure and variability of the internal gravity wave field and tidal currents in this remote region. At ISW, coherence between vertically separated sensors was used to estimate vertical wave number bandwidth. Energy and bandwidth estimates are compared with previous studies in both ice-covered and temperate oceans. Using the measurements of the internal wave field and existing parameterizations of mixing, the authors estimate the vertical heat flux from the Warm Deep Water toward the surface. Tidal currents contributed significantly to the total measured horizontal velocity variance. The tides

were primarily barotropic and increased toward the west in both the semidiurnal and diurnal frequency bands. It is suggested that the stronger tidal currents to the west over the shallower water of the upper continental slope, are indirectly responsible for the higher internal wave energy at site C relative to ISW. (Auth. mod.)

#### J-57006

Bryan, F.O., **Axial angular momentum balance of a global ocean general circulation model**, *Dynamics of atmospheres and oceans*, Mar. 1997, 25(3), p.191-216, 40 refs.

This study examines the axial angular momentum balance of a non-eddy-resolving global ocean general circulation model, from the perspective of the geographical and seasonal variability of angular momentum and from the perspective of the torques acting on the ocean through its surfaces. The purpose is to provide an estimate of the magnitude of the seasonal storage of angular momentum in the ocean and hence the oceanic excitation of variability in length of day, and to elucidate the role of the ocean in transferring angular momentum between the atmosphere and the Earth's crust. Although the southern ocean region containing the Antarctic Circumpolar Current makes the largest contribution to both the annual mean oceanic angular momentum and its seasonal variability, inclusion of the rest of the world ocean reduces both of these quantities to about two-thirds of the value of the southern ocean alone. The annual, global mean angular momentum is found to be insensitive to most model choices except for the isopycnal diffusivity. The seasonal variability, on the other hand, is insensitive to the isopycnal diffusivity, but sensitive to the smoothness of the representation of topography and moderately sensitive to horizontal and vertical friction parameterizations. The torque balance at all latitudes, including within the antarctic circumpolar belt, is between wind stress and bottom pressure torques. Two commonly used wind stress climatologies, one based on historical marine meteorological observations and the other based on operational weather analyses, differ in the sign of the globally integrated wind stress torque. (Auth. mod.)

#### J-57030

Reason, C.J.C., Allan, R.J., Lindesay, J.A., **Evidence for the influence of remote forcing on interdecadal variability in the southern Indian Ocean**, *Journal of geophysical research*, May 15, 1996, 101(C5), p.11,867-11,882, 30 refs.

Significant interdecadal variability in austral summer sea surface temperature (SST) and atmospheric circulation patterns over the wider Indian Ocean region is reported. A global ocean general circulation model is used to investigate the dynamical response of the ocean to the observed interdecadal variability in the local winds and to various remote wind forcings. The potential thermodynamic effect of the winds on the surface heat flux is specifically excluded. Attention is focused on SST anomalies in the southern Indian Ocean, particularly the Agulhas Current, retroflexion, and outflow zones, because this is where the observations exhibit the most prominent SST variability. When the observed Indian Ocean epoch winds are imposed, the dynamical response of the model leads to SST anomalies of the right sign as the observations but smaller in both magnitude and areal extent. (Auth. mod.)

#### J-57031

Woodworth, P.L., Vassie, J.M., Hughes, C.W., Meredith, M.P., **Test of the ability of TOPEX/POSEIDON to monitor flows through the Drake Passage**, *Journal of geophysical research*, May 15, 1996, 101(C5), p.11,935-11,947, 33 refs.

TOPEX/POSEIDON (T/P) altimeter data from the Drake Passage (DP) area of the southern ocean, near to the highest latitudes accessible by the satellite, are found to agree as well, in general, to data from an extensive set of in situ instrumentation as has been observed for other parts of the ocean. Root-mean-square (rms) differences between subsurface pressures (SSP) measured by altimetry and bottom pressures (BP) measured by in situ devices are approximately 2 mbar in the northern DP and 4 mbar in the south, after application of a 2-day low-pass filter. Two mbar accuracy would suggest that altimetry could be capable of providing useful additional information on Antarctic Circumpolar Current (ACC) transport fluctuations through the DP on seasonal and interannual timescales. Even if the altimetric and in situ observations were perfect, would they provide information directly relatable to transport variability through the passage? This question has been studied by means of Fine-Resolution Ant-



arctic Model (FRAM) numerical modeling investigations which have demonstrated the complexity of the correlation between the variability in DP transport and SSP (or sea level). (Auth. mod.)

#### J-57034

Nunes Vaz, R.A., Lennon, G.W., **Physical oceanography of the Prydz Bay region of Antarctic waters**, *Deep-sea research*, May 1996, 43(5), p.603-641, Refs. p.639-641.

Hydrographic data from 4 major Australian cruises to the Prydz Bay region are interpreted to show features of the large-scale circulation that remain consistent across a number of years. A large cyclonic gyre, extending from within the Bay to the Antarctic Divergence northwest of the Bay, is recognized in all of the data. It is associated with a relatively narrow coastal current that runs from the southern limits of Prydz Bay past the Amery Ice Shelf and continues westward after leaving the Bay along the Mac. Robertson Land shelf. Part of the current flows offshore near 63°E, while another fraction continues westward. Data from a number of current-meter moorings deployed within the Bay and on the MacRobertson Land shelf lend support to the interpretation of gross features of the circulation. This paper tests the hypothesis, dynamically, that locally formed Antarctic Bottom Water observed near the foot of the continental slope at 62°E in 1974, had its origin in Prydz Bay. An integral model of the descent of a dense plume over a sloping boundary, also incorporating the fully non-linear equation of state of seawater, implies an origin either within Prydz Bay or to the west of the Bay. (Auth. mod.)

#### J-57035

Cunningham, A.P., Barker, P.F., **Evidence for westward-flowing Weddell Sea Deep Water in the Falkland Trough, western South Atlantic**, *Deep-sea research*, May 1996, 43(5), p.643-654, Refs. p.653-654.

The North Scotia Ridge controls the eastward and northward flow of the Antarctic Circumpolar Current (ACC) emerging from Drake Passage. Existing physical oceanographic data in this region are sparse and do not define the flow pattern of Circumpolar Deep Water (CDW) within the ACC, or of Weddell Sea Deep Water (WSDW) heading northward beneath it, in the region of the North Scotia Ridge and Falkland Trough. 3.5-kHz reflection profiles show mudwaves at the surface of a sediment drift along the axis of the eastern Falkland Trough that have a consistent NE-SW alignment and are migrating SE, indicating persistent westward bottom-current flow along the trough axis. Sediment thinning and non-deposition at the southern drift margin indicate intensified westward flow, considered to be WSDW from the Malvinas Outer Basin to the east. (Auth. mod.)

#### J-57051

Rees, A.P., Owens, N.J.P., Upstill-Goddard, R.C., **Nitrous oxide in the Bellingshausen Sea and Drake Passage**, *Journal of geophysical research*, Feb. 15, 1997, 102(C2), p.3383-3391, 45 refs.

Concentrations of dissolved and atmospheric nitrous oxide, N<sub>2</sub>O, were measured in the austral spring of 1992 in the Drake Passage and Bellingshausen Sea, as part of the United Kingdom Joint Global Ocean Flux Study expedition to the southern ocean. In the Drake Passage, surface N<sub>2</sub>O saturations were generally very close to atmospheric equilibrium, although several anomalous points were associated with the presence of frontal and eddy-like features within the Antarctic Polar Frontal Zone and at the Continental Water Boundary. Other observations reflect upwelling of Circumpolar Deep Water at approximately 70°S, resulting in the accumulation of N<sub>2</sub>O under the winter sea ice and its subsequent release to the atmosphere following the ice retreat. North of the upwelling region, Antarctic Surface Water formed from the mixing of surface waters and ice melt was moderately depleted in N<sub>2</sub>O with respect to the atmosphere, a minimum 90% of saturation. (Auth. mod.)

#### J-57058

**Correction to "On the temporal variability of the transport through Drake Passage" by Michael P. Meredith, John M. Vassie, Karen J. Heywood, and Robert Spencer**, *Journal of geophysical research*, Feb. 15, 1997, 102(C2), p.3501, 1 ref. For pertinent paper see J-56046.

This note corrects a textual elision in the original paper.

#### J-57101

McConnell, J.R., Winterle, J.R., Bales, R.C., Thompson, A.M., Stewart, R.W., **Physically based inversion of surface snow concentrations of H<sub>2</sub>O<sub>2</sub> to atmospheric concentrations at South Pole**, *Geophysical research letters*, Feb. 15, 1997, 24(4), p.441-444, 10 refs.

A unique series of surface snow samples, collected from Nov., 1994 through Jan., 1996 at South Pole and analyzed for H<sub>2</sub>O<sub>2</sub>, were used to test a physically based model for the atmosphere-to-snow component of the overall transfer function. A comparison of photochemical model estimates of atmospheric H<sub>2</sub>O<sub>2</sub>, (1) demonstrates that the surface snow acts as an excellent archive of atmospheric H<sub>2</sub>O<sub>2</sub> and (2) suggests that snow temperature is the dominant factor determining atmosphere-to-surface snow transfer at South Pole. The estimated annual cycle in atmospheric H<sub>2</sub>O<sub>2</sub> concentration is approximately symmetric about the summer solstice, with a peak value of ca. 280 pptv and a minimum around the winter solstice of ca. 1 pptv, although some asymmetry results from the springtime stratospheric ozone hole over Antarctica. (Auth. mod.)

#### J-57106

Mordasova, N.V., **Chlorophyll studies in the Atlantic South Polar Frontal Zone** [Issledovanie khlorofilla v IUPFZ Atlanticheskogo okeana s ispol'zovaniem pogruzhaemogo fluorimetra "Akvatraka"], *Elektrona Karlsberga v IUzhnoi Poliarnoi Frontal'noi zone*, Tom 2. Biologicheskie aspekty sushchestvovaniia i raspredeleniia (*Electrona carlsbergi* in the South Polar Frontal zone, Vol.2. Biological aspects of life and distribution). Edited by V.V. Maslennikov, Moscow, Vsesoiuznyi nauchno-issledovatel'skii institut morskogo rybnogo khoziaistva i okeanografii (VNIRO), 1991, p.5-12, In Russian with English summary. 13 refs.

#### DLC SH351.E44E43 1991 Vol.2

Presented are results of parallel studies of chlorophyll concentrations, in summer, in the South Polar Frontal Zone (SPFZ) of southwestern Atlantic using spectrophotometric and fluorescence techniques with the submersible fluorimeter "Aquatrac". With the exception of particular points in subantarctic waters, and outside the southern boundary of the SPFZ (i.e. in antarctic waters), chlorophyll *a* concentrations exceed 1 µg/l at 50-75 m depth. Maximum values are reported by the southern boundary of the SPFZ in the gradient zone, where large amounts of organic substance occur, and also in zones of various gyres. Chlorophyll concentrations in the euphotic layer (total to 150 mg/m<sup>2</sup>) allow one to consider the SPFZ as one of the most productive areas of the world ocean. (Auth. mod.)

#### J-57107

Zemskii, A.V., Zozulia, S.A., **Distribution of *E. carlsbergi* in relation to latitudinal zonality of the southern ocean** [Funktsional'noe delenie areala *E. carlsbergi* (Taning, 1932) sem. Myctophidae v svyazi s shirotnoi zonal'nost'iu IUzhnogo okeana], *Elektrona Karlsberga v IUzhnoi Poliarnoi Frontal'noi zone*, Tom 2. Biologicheskie aspekty sushchestvovaniia i raspredeleniia (*Electrona carlsbergi* in the South Polar Frontal zone, Vol.2. Biological aspects of life and distribution). Edited by V.V. Maslennikov, Moscow, Vsesoiuznyi nauchno-issledovatel'skii institut morskogo rybnogo khoziaistva i okeanografii (VNIRO), 1991, p.34-58, In Russian with English summary. Refs. p.56-58.

#### DLC SH351.E44E43 1991 Vol.2

Interdisciplinary investigations were carried out from Mar. 20 to Apr. 10, 1989 in the South Atlantic Ocean to determine mature, prespawning individuals and to discover spawning grounds of *E. carlsbergi*. Serious disturbances in latitudinal zonality were noted, which were linked with significant meandering of the Antarctic Circumpolar Current caused by the bottom topography. The following zones, with different vertical water structure, were distinguished (from north to south): Subtropical Zone, Subtropical Frontal Zone, Subantarctic Zone, South Polar Frontal Zone and Antarctic Zone. Functional zonation of *E. carlsbergi* range of distribution in the South Atlantic is suggested, with the South Polar Frontal Zone as the feeding ground, and the Subantarctic and Subtropical Frontal zones as reproduction areas. (Auth. mod.)



**J-57112**

Zarikhin, I.P., **Geomorphological characteristic of the South Georgia region** [Kratkaia geomorfologicheskaiia kharakteristika raiona k severy ot ostrova IUzhnaia Georgiia], Elektrona Karlsberga v IUzhnoi Poliarnoi Frontal'noi zone, Tom 1. Usloviia obitaniia i raspredeleniia. Metodika poiska i issledovaniia. Problemy obrabotki syr'ia (*Electrona carlsbergi* in the South Polar Frontal zone, Vol.1. Habitat and distribution. Scouting and research techniques. Problems of raw fish processing). Edited by V.V. Maslennikov, Moscow, Vsesoiuznyi nauchno-issledovatel'skii institut morskogo rybnogo khoziaistva i okeanografii (VNIRO), 1990, p.13-23, In Russian with English summary. 11 refs.

**DLC SH351.E44E43 1990 Vol.1**

A description of the submarine topography of the South Georgia region is given based on records obtained during various cruises of the trawler *Vozrozhdenie*. The oceanographic survey, carried out by deepwater echosounders and by the satellite navigation system, revealed and delineated morpho-structural elements of the sea bottom as semi-closed mountains and hills. These were most distinct in the eastern part of the investigated area, stretching southward. It is pointed out that such topographic features affect directly the dynamics of water masses, meandering of the Polar Frontal zone boundaries and the mixing of the Weddell Sea waters with the Antarctic Convergence. (Auth. mod.)

**J-57114**

Arzhanova, N.V., **Hydrochemical indicators of frontal zones in the South Atlantic** [Gidrokhimicheskie pokazateli frontal'nykh zon v IUzhnoi Atlantike], Elektrona Karlsberga v IUzhnoi Poliarnoi Frontal'noi zone, Tom 1. Usloviia obitaniia i raspredeleniia. Metodika poiska i issledovaniia. Problemy obrabotki syr'ia (*Electrona carlsbergi* in the South Polar Frontal zone, Vol.1. Habitat and distribution. Scouting and research techniques. Problems of raw fish processing). Edited by V.V. Maslennikov, Moscow, Vsesoiuznyi nauchno-issledovatel'skii institut morskogo rybnogo khoziaistva i okeanografii (VNIRO), 1990, p.78-90, In Russian with English summary. 2 refs.

**DLC SH351.E44E43 1990 Vol.1**

Significant regularities of the spatial distribution of hydrochemical elements in frontal zones of the South Atlantic are discussed. The horizontal gradient of oxygen, phosphorus and nitrogen distribution, in the upper 300 m layer, can be used as an indicator of the Subtropical Frontal Zone; horizontal gradient of oxygen, nitrogen and silicon distribution, in the upper 300 m water layer, phosphorus distribution in the layer from 100 m to 300-400 m, an abrupt change in the thickness of the upper mixed layer, and deepening of minimum oxygen layer, serve as indicators of the South Polar Frontal Zone. Maximum horizontal gradient of silicon distribution within the upper 300 m layer, and the interval from 25 to 35 in silicon and phosphorus ratio from the surface to the seasonal pycnocline, may indicate the Secondary Frontal Zone. (Auth.)

**J-57116**

Zubarevich, V.L., Mordasova, N.V., **Ammonium nitrogen and urea in the SPFZ of the Atlantic Ocean** [Azot ammoniinyi i mochevina v raione IUzhnoi Poliarnoi Frontal'noi zony Atlanticheskogo okeana], Elektrona Karlsberga v IUzhnoi Poliarnoi Frontal'noi zone, Tom 1. Usloviia obitaniia i raspredeleniia. Metodika poiska i issledovaniia. Problemy obrabotki syr'ia (*Electrona carlsbergi* in the South Polar Frontal zone, Vol.1. Habitat and distribution. Scouting and research techniques. Problems of raw fish processing). Edited by V.V. Maslennikov, Moscow, Vsesoiuznyi nauchno-issledovatel'skii institut morskogo rybnogo khoziaistva i okeanografii (VNIRO), 1990, p.109-117, In Russian with English summary. 8 refs.

**DLC SH351.E44E43 1990 Vol.1**

Results are presented of a study of ammonium nitrogen and urea, essential elements for phytoplankton development, in the Atlantic South Polar Frontal zone (SPFZ). Maximum ammonia concentrations are associated with the southern boundary of SPFZ and zones of various eddies; the distribution of urea in the area resembles the patchy distribution pattern of living organisms. In summer, these nitrogen compounds concentrate in

the euphotic layer, with maximum amounts at 30-75 m depth exceeding 1.5-2.0 times those at the surface. Rich layers are associated with the depth at which concentrations of living organisms, particularly lanternfish, occur. These layers can serve as indicators in scouting operations. In winter, patchy distribution of both ammonia and urea is observed; high concentration patches are registered at depths from 0 to 1000 m. Large amounts of ammonia and urea are linked with the depth of the habitation of wintering zooplankton and other living organisms. (Auth.)

**J-57117**

Bogdanov, M.A., Potaichuk, S.I., **SST maps for meandering variability of the SPFZ** [Otsenka stepeni izmenchivosti meandrirovaniia Iuzhnoi Poliarnoi Frontal'noi zony po kartam TPO], Elektrona Karlsberga v IUzhnoi Poliarnoi Frontal'noi zone, Tom 1. Usloviia obitaniia i raspredeleniia. Metodika poiska i issledovaniia. Problemy obrabotki syr'ia (*Electrona carlsbergi* in the South Polar Frontal zone, Vol.1. Habitat and distribution. Scouting and research techniques. Problems of raw fish processing). Edited by V.V. Maslennikov, Moscow, Vsesoiuznyi nauchno-issledovatel'skii institut morskogo rybnogo khoziaistva i okeanografii (VNIRO), 1990, p.117-122, In Russian with English summary.

**DLC SH351.E44E43 1990 Vol.1**

The possibility is discussed of the use of SST maps derived from satellite information for the evaluation of meandering variability of the South Polar Frontal zone. As the variability criterion, the authors used the index of "the degree of meandering" -K, introduced by E.I. Baranov. Index K, calculated for the period from Oct. 1987 to July 1990 with the discretion of 7-12 days, can serve as the additional characteristic of the scale of interaction of different water masses. (Auth. mod.)

**J-57118**

Maslennikov, V.V., Khomutov, E.V., **Satellite information on the structure of oceanic fronts in the southwestern Atlantic** [Ispol'zovanie sputnikovoï informatsii pri issledovanii struktury okeanicheskikh frontov v IUgo-Zapadnoi Atlantike], Elektrona Karlsberga v IUzhnoi Poliarnoi Frontal'noi zone, Tom 1. Usloviia obitaniia i raspredeleniia. Metodika poiska i issledovaniia. Problemy obrabotki syr'ia (*Electrona carlsbergi* in the South Polar Frontal zone, Vol.1. Habitat and distribution. Scouting and research techniques. Problems of raw fish processing). Edited by V.V. Maslennikov, Moscow, Vsesoiuznyi nauchno-issledovatel'skii institut morskogo rybnogo khoziaistva i okeanografii (VNIRO), 1990, p.122-141, In Russian with English summary. 3 refs.

**DLC SH351.E44E43 1990 Vol.1**

Satellite information was used in cruises of the trawler *Vozrozhdenie* in southwestern Atlantic. The arrangement of the unit, performance, methods of operation, image preparation and analysis techniques are discussed. Examples illustrate the possibility of using satellite data in studies of the structure of oceanic fronts, particularly the South Polar Frontal zone, and frontal zones in the southwestern Atlantic. (Auth. mod.)

**J-57170**

Weppernig, R., Schlosser, P., Khatiwala, S., Fairbanks, R.G., **Isotope data from Ice Station Weddell: implications for deep water formation in the Weddell Sea**, *Journal of geophysical research*, Nov. 15, 1996, 101(C10), p.25,723-25,739, 45 refs.

This contribution presents a tracer data set (helium and oxygen isotopes) collected during the drift of Ice Station Weddell and discusses it in terms of its relevance for deep and bottom water formation in the southern and western Weddell Sea. The authors use  $^3\text{He}$  and  $\delta^{18}\text{O}$  data for determination of the transfer of Weddell Deep Water or Warm Deep Water into the winter mixed layer. The  $^4\text{He}$  concentration and the  $\text{H}_2^{18}\text{O}/\text{H}_2^{16}\text{O}$  ratio provide information on the relative contributions of the individual shelf water masses to Weddell Sea Deep Water and Weddell Sea Bottom Water. (Auth. mod.)

**J-57182**

Smetacek, V., De Baar, H.J.W., Bathmann, U.V., Lochte, K., Van



Der Loeff, M.M.R., **Ecology and biogeochemistry of the Antarctic Circumpolar Current during austral spring: a summary of Southern Ocean JGOFS cruise ANT X/6 of R.V. *Polarstern*, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.1-21, Refs. p.18-20.**

The R.V. *Polarstern* cruise ANT X/6, part of the international Southern Ocean JGOFS program, investigated phytoplankton spring bloom development and its biogeochemical effects in different water masses of the Atlantic sector of the southern ocean: the Polar Frontal region (PFR), the southern Antarctic Circumpolar Current zone (sACC), its boundary with the Weddell Gyre (AWB) and the marginal ice zone (MIZ). The relative roles of physical stability, iron limitation and grazing pressure in enhancing or constraining phytoplankton biomass accumulation were examined. Three sections were carried out between the PFR and the ice edge along the 6°W meridian from early Oct. to late Nov. 1992. This paper summarizes the major findings of the cruise and discusses their implications for the understanding of southern ocean ecology and biogeochemistry. A major finding was the negligible build-up of plankton biomass and concomitant absence of CO<sub>2</sub> drawdown associated with seasonal retreat of the ice cover. (Auth. mod.)

#### J-57183

Veth, C., Peeken, I., Scharek, R., **Physical anatomy of fronts and surface waters in the ACC near the 6°W meridian during austral spring 1992, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.23-49, Refs. p.47-49.**

Small-scale features of the Antarctic Circumpolar Current (ACC) along a meridional section at 6°W between the Polar Front and the ACC-Weddell Gyre Boundary Front are discussed. The section covered 3 distinct fronts: the Polar Front, the Southern Polar Front, and the ACC-Weddell Gyre Boundary Front. Physical measurements during repeated transects over a period of 6 weeks in Oct./Nov. revealed a large variability in the Polar Frontal region, indicating meandering and eddy shedding. The positions of the Southern Polar Front and the ACC-Weddell Gyre Boundary Front were observed to be far more stable than that of the Polar Front. A possible reconstruction of the meandering flow field near the Polar Front, based upon the physical observations, is presented. Details in the flow field coincide with the spatial distribution of a number of biological parameters such as phytoplankton biomass and species, and photosynthetic pigments. Evidence is presented that the Antarctic Zone of the ACC can be subdivided into a number of spheres of influence related to the fronts. (Auth. mod.)

#### J-57184

Bathmann, U.V., Scharek, R., Klaas, C., Dubischar, C.D., Smetacek, V., **Spring development of phytoplankton biomass and composition in major water masses of the Atlantic sector of the Southern Ocean, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.51-67, Refs. p.65-67.**

The distribution and composition of phytoplankton stocks in relation to water masses were studied in South Atlantic Ocean in Oct./Nov. 1992. The study comprised one west-to-east transect along the ice edge and several meridional transects that extended from the closed pack ice of the Weddell Sea, across the southern Antarctic Circumpolar Current (ACC) and into the Polar Frontal Zone. Chlorophyll *a* concentrations, temperature and salinity were recorded continuously in surface water during the transects. Vertical distribution and species composition of microplankton were assessed microscopically in discrete water samples collected at stations. Contrary to expectations, no significant enhancement of phytoplankton biomass was found in the vicinity of the retreating ice cover. Melt-water-influenced zones were indicated by low salinity but also by abundance of characteristic sea-ice species such as *Nitzschia closterium* and *N. prolongatoides*. Large phytoplankton blooms developed during the 6 weeks of investigation in the region of the Polar Front, from 0.7 to >4 mg chl *a*/m<sup>3</sup>. Three distinct blooms extended below 70 m depth, each dominated by a different diatom species (*Fragilariopsis kerguelensis*, *Corethron inerme* and *C. criophilum*). (Auth. mod.)

#### J-57185

Quéguiner, B., Tréguer, P., Peeken, I., Scharek, R., **Biogeochemical dynamics and the silicon cycle in the Atlantic sector of the Southern Ocean during austral spring 1992, *Deep-sea research***

***II*, Jan.-Feb. 1997, 44(1-2), p.69-89, Refs. p.86-89.**

High biogenic silica (BSi) concentrations were recorded during late Nov. at the southern border of the Polar Frontal region (PFR). The position of the BSi maximum at depth suggested the occurrence of a sinking diatom population. By contrast, siliceous biomass was low in the Marginal Ice Zone (MIZ) despite a sea-ice retreat of 200 km during the study period. Diatoms released from the receding ice were not actively growing. The Permanently Open Ocean Zone also showed very low BSi biomass and appeared as an area where phytoplankton are not dominated by siliceous organisms, especially in its middle part where BSi/POC (particulate organic carbon) molar ratios ranged between 0.04 and 0.06 at 53°S, from surface to 200 m depth. At the southern border of the PFZ, the bloom coincided with an area of high lithogenic silica concentrations probably of aeolian origin. In addition, BSi/POC molar ratios measured in the PFZ were the highest ever recorded in the surface waters of the southern ocean. Implications for the total annual production of BSi for the southern ocean are discussed. (Auth. mod.)

#### J-57186

Bakker, D.C.E., De Baar, H.J.W., Bathmann, U.V., **Changes of carbon dioxide in surface waters during spring in the Southern Ocean, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.91-127, Refs. p.123-127.**

The fugacity of CO<sub>2</sub> (fCO<sub>2</sub>) and the content of chlorophyll *a* in surface-water were determined during consecutive sections between 47° and 60°S along 6°W in austral spring, Oct.-Nov. 1992. In the Polar Frontal region, the fCO<sub>2</sub> of surface-water decreased from slightly below the atmospheric value to 50 µatm below it. This was accompanied by the development of diatom blooms. Seasonal warming of 1.2°C and air-sea exchange partly compensated the decrease of fCO<sub>2</sub> by biological activity. Meanders of the Polar Frontal jet and a mesoscale eddy were reflected in spatial variability of fCO<sub>2</sub> and chlorophyll *a*. Systematic observations indicated relationships between fCO<sub>2</sub> and chlorophyll *a*, albeit changing with time. The combination of biological CO<sub>2</sub>-uptake with formation of Antarctic Intermediate Water (AAIW) makes the Polar Front a site of combined biological/physical CO<sub>2</sub>-drawdown from the atmosphere. In the southern part of the Antarctic Circumpolar Current and the Southern Frontal region, fCO<sub>2</sub> increased 7-8 µatm. (Auth. mod.)

#### J-57187

Dehairs, F., et al, **δ<sup>13</sup>C of Southern Ocean suspended organic matter during spring and early summer: regional and temporal variability, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.129-142, Refs. p.141-142.**

Observations are presented for stable carbon isotope abundance (δ<sup>13</sup>C) and organic carbon and nitrogen content of suspended organic matter from the Antarctic Circumpolar Current and Polar Front during spring and early summer. The Polar Front Zone was characterized by elevated plankton biomasses and phytoplankton activity, which also increased significantly over the one-month investigation period. From the beginning of the phytoplankton bloom δ<sup>13</sup>C values of suspended organic matter in the Polar Front were high, exceeding values predicted from the relationship with CO<sub>2(aq)</sub> concentration observed in other areas of the southern ocean. Later in the season δ<sup>13</sup>C of suspended organic matter in the Polar Front became more negative despite continued high biomass and productivity. Ambient CO<sub>2</sub> concentration and cell growth rate, therefore, are not the only factors controlling the δ<sup>13</sup>C of phytoplankton. The possible additional impact of shifts in nitrogen uptake regime is discussed. (Auth.)

#### J-57188

Löscher, B.M., De Baar, H.J.W., De Jong, J.T.M., Veth, C., Dehairs, F., **Distribution of Fe in the Antarctic Circumpolar Current, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.143-187, Refs. p.182-187.**

The large-scale distributions of dissolved and total Fe in surface and deep waters of the Antarctic Circumpolar Current exhibit strong relationships with hydrography and biological processes. The mean dissolved Fe concentrations are low in surface waters of the Antarctic Circumpolar Current (0.31-0.49 nM, with a minimum of 0.17 nM) and higher (averaging 1.1-1.9 nM) in the Polar Frontal region. Enhanced dissolved surface water concentrations in the Polar Frontal region are attributed to input from the continental shelf and coincide with phytoplankton spring blooms of large



diatoms. The effects of sea-ice melting and iceberg melting on the Fe concentrations in the Antarctic Bottom Water are higher than those of other water masses in the Antarctic Circumpolar Current, consistent with the nepheloid layer as well as diagenetic input from shelf sediments. (Auth. mod.)

#### J-57191

De Baar, H.J.W., Van Leeuwe, M.A., Scharek, R., Goeyens, L., Bakker, K.M.J., Fritsche, P., **Nutrient anomalies in *Fragilariopsis kerguelensis* blooms, iron deficiency and the nitrate/phosphate ratio (A.C. Redfield) of the Antarctic Ocean, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.229-260, Refs. p.257-260.**

In blooms of *Fragilariopsis kerguelensis* at the southern rim of the Polar Frontal region, the dissolved ratio  $\text{NO}_3/\text{PO}_4$  increased from the winter value of 14 to 15.8 to as high as 25. Blooms more northerly in the Polar Frontal region were dominated by other diatoms and higher dissolved Fe ( $>1$  nM), and showed only very modest  $\text{NO}_3/\text{PO}_4$  anomalies. From nutrient inventories the biogenic pools (PON and DON) and export of settling biogenic debris would have N/P ratios as low as 4.4-6.1 compared to 14 in deep antarctic waters. Such shifts are consistent with decreasing availability of Fe for nitrate reduction, but also may be due to intrinsically low N/P in *F. kerguelensis* cells. The observed N/P fractionation in *F. kerguelensis* blooms at the Polar Frontal region, in combination with the local formation of AAIW flowing northward, might help maintain the lower N/P ratio at 14 in antarctic waters, as compared to a 15 as an average value for the other oceans. (Auth. mod.)

#### J-57193

Meyerdierks, D., Bolt, B., Kirst, G.O., **Spatial and vertical distribution of particulate dimethylsulphoniopropionate (DMSP) during spring in the Atlantic sector of the Southern Ocean, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.283-297, Refs. p.296-297.**

Dimethylsulphoniopropionate (DMSP) concentrations in relation to phytoplankton biomass and species composition were investigated on four transects between  $47^\circ\text{S}$  and  $60^\circ\text{S}$  along  $6^\circ\text{W}$  in Oct./Nov. 1992. Particulate DMSP concentrations at 20 m depth in the 3 pelagic regimes, Polar Frontal Zone, southern Antarctic Circumpolar Current and the northern rim of the Weddell Gyre, were about 25-66, 5 and 3-14 nM, respectively. DMSP chlorophyll *a* ratios for the 3 zones were 32-92, 10-35 and 25 nmol, respectively. In the Polar Frontal Zone, the majority of DMSP was found in the 5-20  $\mu\text{m}$  size fraction. Some DMSP was produced by algae  $>20$   $\mu\text{m}$  (mainly diatoms), but the contribution of algae  $<5$   $\mu\text{m}$  was negligible. As such, the antarctic phytoplankton community sampled in the open southern ocean cannot be considered especially active DMSP producers compared to temperate and tropical algae. (Auth.)

#### J-57196

Kähler, P., Bjørnsen, P.K., Lochte, K., Antia, A., **Dissolved organic matter and its utilization by bacteria during spring in the Southern Ocean, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.341-353, Refs. p.352-353.**

Concentrations of dissolved organic carbon (DOC) and nitrogen (DON) were measured during early spring 1992 at a number of stations along the Polar Front in the north, the zone of melting sea-ice in the south, and waters of the Antarctic Circumpolar Current in between. Concentrations of DOC were low in deep water, with generally similar or slightly higher values in the surface mixed layer. DOC:DON ratios are wider in surface water than in deep water, i.e. surface accumulations contain relatively C-rich dissolved organic matter. The highly variable distribution of the surface DOC was not related to hydrographic or biotic features (fronts, plankton development) indicating the lability and transient occurrence of this material. Growth rates of bacteria were determined in subsamples from 5 l 0.8- $\mu\text{m}$ -filtered batches of seawater incubated in the dark at *in situ* temperatures. Bacterial growth in these experiments depended strongly on the amount of initial DOC. The experiments showed that at least 40-60% of the DOC in excess of deep water concentrations was available to bacteria. (Auth. mod.)

#### J-57202

Van Der Loeff, M.M.R., Friedrich, J., Bathmann, U.V., **Carbon export during the Spring Bloom at the Antarctic Polar Front,**

**determined with the natural tracer  $^{234}\text{Th}$ , *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.457-478, Refs. p.476-478.**

Profiles of particulate and dissolved  $^{234}\text{Th}$  were obtained during the JGOFS southern ocean expedition on R.V. *Polarstern* during Oct./Nov. 1992. Measurements were made on 3 transects across the Antarctic Circumpolar Current, from the Polar Front (PF) in the north to the Weddell Sea/ACC boundary in the south. The dissolved  $^{234}\text{Th}/^{238}\text{U}$  ratio in surface waters gradually decreased during the development of the plankton bloom at the PF. In the period between the first 2 transects, the  $^{234}\text{Th}$  activity removed from the dissolved phase had shifted to particles that had been produced and, as a result, the total activity ratio remained unchanged. The decrease in dissolved  $^{234}\text{Th}$  corresponds with decreases in dissolved nutrients and  $\text{pCO}_2$ , and with increases in chlorophyll and plankton biomass. (Auth.)

#### J-57203

Dehairs, F., Shopova, D., Ober, S., Veth, C., Goeyens, L., **Particulate barium stocks and oxygen consumption in the Southern Ocean mesopelagic water column during spring and early summer: relationship with export production, *Deep-sea research II*, Jan.-Feb. 1997, 44(1-2), p.497-516, Refs. p.514-516.**

Particulate barium was analyzed in the upper 600 m of the southern ocean water column during repeated transects, in Oct.-Nov. 1992, between the Weddell Gyre and the Polar Front Zone (PFZ). Using an inverse one-dimensional advection-diffusion-consumption model,  $\text{O}_2$  consumption between the base of the mixed layer and 1000 m was estimated. For the southern Antarctic Circumpolar Current (ACC), depth-integrated rates of  $\text{O}_2$  consumption correlate significantly with primary production and mesopelagic particulate Ba concentration. For the PFZ, these relationships are subject to more speculation since this is a region of intense mixing, and the appropriate value of the turbulent diffusion coefficient is uncertain. For the ACC, the observed relationship presents the possibility of defining a transfer function between export production to the mesopelagic depth zone and mesopelagic Ba accumulation. The observed regression between rate of  $\text{O}_2$  consumption and primary production in the southern ACC suggests that about 10% of the synthesized organic carbon can be oxidized in the upper 1000 m of the water column. (Auth. mod.)

#### J-57235

Albarède, F., Goldstein, S.L., Dautel, D., **Neodymium isotopic composition of manganese nodules from the southern and Indian Oceans, the global oceanic neodymium budget, and their bearing on deep ocean circulation, *Geochimica et cosmochimica acta*, Mar. 1997, 61(6), p.1277-1291, 73 refs.**

The isotopic composition of Nd in Mn nodules is usually similar to that of their ambient seawater, and the global patterns mimic the broad features of present-day deep ocean circulation. Because the Mn nodules as sampled reflect the average Nd in the deep water masses over periods of  $10^5$ - $10^6$  years, the consistency with present-day seawater indicates that the present-day patterns of deep ocean circulation predominated throughout the Pleistocene. An exception is in the Drake Passage and Argentine Basin, where more nodules are more radiogenic than the ambient seawater and reflect either a weakening of NADW during glacial stages or, alternatively, a local source which is clearly present in diagenetic Mn nodules from this region. The global Nd budget in the southern ocean is consistent with models of geostrophic transport: Nd in the ACC can be accounted for by a mixture of non-radiogenic Nd from Atlantic and radiogenic Nd from Pacific sources. The radiogenic component released by volcanogenic particles in the nepheloid layer, erupted from the peri-Pacific rim volcanoes, exerts a major influence on Pacific seawater. The residence time of Nd in the ACC is estimated to be 70 years. Mixing therefore requires more than one revolution around Antarctica. (Auth. mod.)

#### J-57315

Kaliazin, V.E., **Problems of investigating sea level in Antarctica [Problemy issledovaniia urovnia moria v Antarktike], *Rossiiskaia Antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No.117, p.58-61, In Russian. 4 refs.**



The author describes the problems associated with obtaining data on sea-level changes from the waters around Antarctica, and discusses current efforts to improve the collection of data necessary for the study of global climate change. The years for which data is available for various Soviet research stations, mainly in the 1960s, are listed.

#### J-57361

Ray, R.D., Egbert, G.D., **Flux of tidal energy across latitude 60°S**, *Geophysical research letters*, Mar. 1, 1997, 24(5), p.543-546, 24 refs.

How and where the ocean tides dissipate their energy are longstanding questions with both oceanographic and astronomical implications. Two decades ago, Doake suggested that flexing of antarctic ice shelves by the underlying ocean tide is an important energy sink, perhaps accounting for over half the global dissipation rate. Here two new and complementary ocean-tide models, both derived from Topex/Poseidon satellite altimeter measurements, are used to determine the flux of tidal energy across 60°S toward the antarctic coastline. Results show relatively small fluxes and they therefore rule out Doake's suggestion: Antarctica is an insignificant sink in the global tidal energy budget. (Auth. mod.)

#### J-57368

De Ruijter, W.P.M., Walsteijn, F.H., Feron, R.C.V., **Oceans and climate: circulation and interbasin exchanges in the Southern Ocean**, *Studies in environmental science*, 1995, No.65A, International Climate Change Research Conference, Maastricht, Dec. 6-9, 1994. Proceedings. Climate change research: evaluation and policy implications. Edited by S. Zwerver, R.S.A.R van Rompaey, M.T.J. Kok and M.M. Berk, p.347-356, 34 refs.

#### DLC QC981.8.C5C6 1995

The Antarctic Circumpolar Current (ACC) is an essential component of the climate system in that it accomplishes a significant poleward flux of heat and exchanges water masses and properties between the South Atlantic, Pacific, and Indian oceans. Characterization of the dynamical balance of the ACC, as provided by measurements and models studied, are discussed.

#### J-57399

Sikes, E.L., Volkman, J.K., Robertson, L.G., Pichon, J.J., **Alkenones and alkenes in surface waters and sediments of the Southern Ocean: Implications for paleotemperature estimation in polar regions**, *Geochimica et cosmochimica acta*, Apr. 1997, 61(7), p.1495-1505, Refs. p.1504-1505.

The concentration of C<sub>37</sub>-C<sub>39</sub> long-chain alkenones and alkenes were determined in surface water and surface sediment samples from the subpolar waters of the southern ocean. Distributions of these compounds were similar in both sample sets indicating little differential degradation between or within compound classes. The relative amounts of the tri- to tetra-unsaturated C<sub>37</sub> alkenones increased with increasing temperature for temperatures below 6°C similar to the di- and tri-unsaturated C<sub>37</sub> alkenones. The C<sub>37</sub> di-, tri-, and tetra-unsaturated methyl alkenones are used in paleotemperature calculations via the U<sub>37</sub><sup>K</sup> and the U<sub>37</sub><sup>K'</sup> ratios. In these datasets, the relative abundances of the C<sub>37:2</sub> and the C<sub>37:3</sub> alkenones as a proportion of the total C<sub>37</sub> alkenones were opposite and strongly related to temperature (the latter with more scatter), but the abundance of the C<sub>37:4</sub> alkenone showed no relationship with temperature. The comparison of water column data with sedimentary temperature estimates suggests that the alkenone distributions are dominated by contributions from the summer when the biomass of *Emiliania huxleyi* and presumably flux to the sediment, is expected to be high. (Auth. mod.)

#### J-57401

Wefer, G., ed, Berger, W.H., ed, Siedler, G., ed, Webb, D.J., ed, **South Atlantic: present and past circulation**, Berlin, Springer-Verlag, 1996, 644p., Refs. passim. For selected papers see J-57402 through J-57412.

#### DLC GC228.6.S655S67 1996

The book presents recent projects in oceanography and marine geoscience (e.g. WOCE, JGOFS, PAGES, ODP) regarding present and past circulation in the South Atlantic. The objective of the book is to integrate results from both oceanographic and geological studies. As the connect-

ing link between the Antarctic and the North Atlantic, the South Atlantic plays a crucial role with regard to the heat budget of the North Atlantic and to the biogeochemical budget of the global ocean. New results from studies of meridional watermass and heat transports are presented. The central theme of geological investigations is the reconstruction of current and productivity systems in the South Atlantic during the last Quaternary. (Auth.)

#### J-57402

Reid, J.R., **On the circulation of the South Atlantic Ocean**, South Atlantic: present and past circulation. Edited by G. Wefer, W.H. Berger, G. Siedler and D.J. Webb, Berlin, Springer-Verlag, 1996, p.13-44, 4 refs.

#### DLC GC228.6.S655S67 1996

In a recent study, maps of the general circulation of the Atlantic Ocean were presented and discussed. The emphasis was placed upon the exchange of waters between the North and South Atlantic as indicated by the patterns of characteristics. The exchange with the waters entering through the Drake Passage involves further discussion of the effect of the Atlantic waters in providing a major defining characteristic of the Circumpolar Water—the layer of warm and saline water. The associated features—the high oxygen and low nutrient concentrations—are also defined well for a long distance downstream in the Antarctic Circumpolar Current. However, it is only the vertical maximum in salinity that persists all along the flow around Antarctica and through the Drake Passage into the South Atlantic. This returning salinity maximum is much lower than the salinity maximum from the north that it meets and mixes with in the South Atlantic. (Auth. mod.)

#### J-57403

Siedler, G., et al, **Zonal WOCE sections in the South Atlantic**, South Atlantic: present and past circulation. Edited by G. Wefer, W.H. Berger, G. Siedler and D.J. Webb, Berlin, Springer-Verlag, 1996, p.83-104, Refs. p.103-104.

#### DLC GC228.6.S655S67 1996

The data from six zonal sections in the World Ocean Circulation Experiment (WOCE) in the tropical and southern Atlantic are used to describe the distribution of water masses. Due to the high spatial resolution, the structure of temperature, salinity, oxygen, silicate and nitrate displays details related to transport and mixing in this region. Temperature-salinity diagrams are also presented which indicate the effects of branching and recirculation loops in the water mass flow. (Auth.)

#### J-57404

Webb, D.J., **Southern boundary of the South Atlantic**, South Atlantic: present and past circulation. Edited by G. Wefer, W.H. Berger, G. Siedler and D.J. Webb, Berlin, Springer-Verlag, 1996, p.211-217, Refs. p.216-217.

#### DLC GC228.6.S655S67 1996

The boundary region between the South Atlantic and southern ocean is discussed, making use of results from the FRAM model and hydrographic sections. Although, at first, the system appears to be a simple one, with a sub-tropical gyre to the north abutting a zonal jet to the south, the detailed structure is more complex. Part of the complexity is well known and arises from the large scale thermohaline circulation, water being transported north in the surface Ekman layer and at depth, and returning south at intermediate levels. More recent work has shown that, in addition, the sub-tropical gyre and the Antarctic Circumpolar Current combine to form the Deacon Cell which transforms surface stress due to the wind down to mid-depths. Further complications arise from the Agulhas eddies which pass through the regions and the constraints on the circulation due to the bottom topography. (Auth.)

#### J-57405

Talley, L.D., **Antarctic Intermediate Water in the South Atlantic**, South Atlantic: present and past circulation. Edited by G. Wefer, W.H. Berger, G. Siedler and D.J. Webb, Berlin, Springer-Verlag, 1996, p.219-238, Refs. p.237-238.

#### DLC GC228.6.S655S67 1996

Maps of the Antarctic Intermediate Water (AAIW) in the Atlantic, and on a global isopycnal which intersects the AAIW in the south, show the location and properties of the salinity and oxygen extrema associated



with the AAIW, and the likely sources of AAIW. These are primarily the surface waters in the southeastern Pacific, which produce the South Pacific AAIW, and surface waters in northern Drake Passage and the Falkland Current loop, which produce the South Atlantic AAIW. This latter source is the primary one for AAIW of the Indian Ocean as well. Winter surface properties and annual-averaged Ekman pumping and Sverdrup transport for the Southern Hemisphere suggest that the formation density of the AAIW is the highest density which can be subducted in the South Pacific. The higher density of AAIW in the South Atlantic may result from more complex processes. (Auth. mod.)

**J-57406**

Peterson, R.G., Johnson, C.S., Krauss, W., Davis, R.E., **Lagrangian measurements in the Malvinas Current**, South Atlantic: present and past circulation. Edited by G. Wefer, W.H. Berger, G. Siedler and D.J. Webb, Berlin, Springer-Verlag, 1996, p.239-247, Refs. p.246-247.

**DLC GC228.6.S655S67 1996**

Direct measurement of magnitude of the northward flow of the Malvinas (Falkland) Current have recently been made with two types of Lagrangian platforms: ALACE floats which cycled between 750 m depth and the sea surface, and 100 m drogued surface drifters. Each data set clearly delineates the path of the Malvinas Current, and the vertical shears inferred from them are commensurate with historical geostrophic shears. Velocities from the surface drifters are used here to adjust geostrophic shears from historical measurements, and the results confirm a large transport of the current, as previously implied by numerical models and a regional inverse calculation. At 42°S, the northward transport of the Malvinas Current in the upper 3000 m appears to be about 70 Sv, several times larger than estimates obtained by adjusting geostrophic shears to assumed levels of no motion. This large barotropic component may have significance in the cross-frontal transfer of intermediate and deep waters from the circumpolar current to the adjacent flow regimes in the South Atlantic, and thus on the inter-basin exchange of water masses. (Auth.)

**J-57407**

Barnier, B., Marchesiello, P., De Miranda, A.P., **Modelling the ocean circulation in the South Atlantic: a strategy for dealing with open boundaries**, South Atlantic: present and past circulation. Edited by G. Wefer, W.H. Berger, G. Siedler and D.J. Webb, Berlin, Springer-Verlag, 1996, p.289-304, Refs. p.303-304.

**DLC GC228.6.S655S67 1996**

The South Atlantic Ocean is widely open to the Indian Ocean and the North Atlantic Ocean, and has a large inflow from the Pacific Ocean through the Drake Passage. Strategies of modelling the ocean circulation in this area require one to consider inter-ocean exchanges. The paper discusses various numerical approaches of the problem. One consists in modelling the world ocean and to study the South Atlantic as a sub-domain. Exchanges between the various oceans are thus determined by the model, and the circulation obtained for the South Atlantic depends upon the overall model behavior. It is a consistent way to diagnose the circulation of the water masses in the ocean with coarse resolution models. Another approach is to limit the modelled domain to the South Atlantic basin, and then deal with the complicated problem of open boundaries. In that case, the simulated circulation of the South Atlantic will largely depend upon the fluxes prescribed at the boundaries. (Auth. mod.)

**J-57408**

Schlitzer, R., **Mass and heat transports in the South Atlantic derived from historical hydrographic data**, South Atlantic: present and past circulation. Edited by G. Wefer, W.H. Berger, G. Siedler and D.J. Webb, Berlin, Springer-Verlag, 1996, p.305-323, Refs. p.322-323.

**DLC GC228.6.S655S67 1996**

Mass and heat transports in the South Atlantic as well as exchange flows with the South Pacific and the Indian Ocean are determined by driving a conservative, steady box-model towards the historical temperature ( $\theta$ ) and salinity ( $s$ ) observations. The optimal model circulation searched for is required to approximately preserve the vertical velocity shear as given by geostrophic calculations, and to correctly reproduce the measured distributions of  $\theta$  and  $s$ . The model is mass, heat and salt conserving and has realistic topography. The adjoint method is applied as an efficient

means for calculating cost function gradients needed during the optimization process. Model experiments show that indeed realistic  $\theta$  and  $s$  model distributions can be obtained with flows that are consistent with geostrophy. Moreover, close agreement between measurements and model is obtained for a variety of model velocity fields that differ considerably with respect to strength of the meridional overturning cell and magnitude of meridional heat transports. All acceptable model solutions show a dominance of northward flow of Antarctic Intermediate Water (AAIW) over warmer, upper layer waters, and all model solutions show net heat gain of the ocean from the atmosphere in the South Atlantic. (Auth. mod.)

**J-57409**

Berger, W.H., Wefer, G., **Expeditions into the past: paleoceanographic studies in the South Atlantic**, South Atlantic: present and past circulation. Edited by G. Wefer, W.H. Berger, G. Siedler and D.J. Webb, Berlin, Springer-Verlag, 1996, p.363-410, Refs. p.403-410.

**DLC GC228.6.S655S67 1996**

The South Atlantic is tightly coupled to the North Atlantic climate amplifying system. At present, enormous amounts of heat are delivered across the equator to the north, with surface and subsurface waters. The return flow occurs at depth, within the coldwater sphere. During the last glacial the Atlantic Heat Conveyor was much less efficient, that is, the North Atlantic heat piracy is a positive feedback on climate change. Warm-ocean sediments accumulated during the Cretaceous, including organic-rich deposits indicative of poorly oxygenated deep waters. Sinking of the sea floor from cooling of the lithosphere, and ridges produced as hot spot tracks determined the main features of the bathymetry. Continued cooling eventually led to large-scale deepwater formation in high latitudes, which is expressed in the first great cooling step in the deep sea, at the end of the Eocene. The second great cooling step saw the buildup of ice on Antarctica, roughly 15 mya, presumably after considerable reduction of atmospheric CO<sub>2</sub>. The third great cooling step consists of ice buildup around the North Atlantic. (Auth. mod.)

**J-57410**

Grieger, B., Schlitzer, R., **Inverse modelling of glacial Atlantic circulation system: investigation of data requirements**, South Atlantic: present and past circulation. Edited by G. Wefer, W.H. Berger, G. Siedler and D.J. Webb, Berlin, Springer-Verlag, 1996, p.411-422, 9 refs.

**DLC GC228.6.S655S67 1996**

A series of model experiments to investigate the data requirements of an inverse model of the Atlantic is described. Results of a first attempt to reconstruct the circulation system of the Atlantic for the last glacial maximum (about 20,000 B.P.) are shown. The amount of data used is quite small compared with an application to the present day Atlantic, for which the model was originally developed. Although the results reflect the difficult data situation, some features of the flow field of the glacial Atlantic are recovered. With some extensions the inverse modeling approach seems to be very promising. (Auth.)

**J-57411**

Duplessy, J.C., et al, **High latitude deep water sources during the last glacial maximum and the intensity of the global oceanic circulation**, South Atlantic: present and past circulation. Edited by G. Wefer, W.H. Berger, G. Siedler and D.J. Webb, Berlin, Springer-Verlag, 1996, p.445-460, Refs. p.459-460.

**DLC GC228.6.S655S67 1996**

Micropaleontological and oxygen isotope analyses of planktonic foraminifera from North Atlantic Ocean and southern ocean sediment cores have been used to reconstruct temperature and salinity of surface waters during the last glacial maximum. Whereas the Norwegian-Greenland Sea and the high latitudes of the North Atlantic experienced a large negative anomaly, the southern ocean maintained salinity values similar or slightly higher than the modern ones around Antarctica, thus favoring winter convection and deep water formation in the Southern Hemisphere. These data have been used to force the zonally averaged, three-basin ocean model of Louvain-La-Neuve. The model reproduces the main trends of the geochemically constrained glacial Atlantic circulation and suggests that



the glacial production of Antarctic Bottom Water was slightly higher than the modern one, whereas that of North Atlantic Deep Water was reduced by about 40%. (Auth.)

#### J-57412

Diekmann, B., et al, **Clay mineral fluctuations in Late Quaternary sediments of the southeastern South Atlantic: implications for past changes of deep water advection**, South Atlantic: present and past circulation. Edited by G. Wefer, W.H. Berger, G. Siedler and D.J. Webb, Berlin, Springer-Verlag, 1996, p.621-644, Refs. p.640-644.

#### DLC GC228.6.S655S67 1996

Downcore clay mineral fluctuations in Late Quaternary sediment cores from the southeastern South Atlantic and adjoining southern ocean are of low amplitude. North of the Antarctic Circumpolar Current/Weddell Gyre boundary, small-scale variations, particularly of clay mineral ratios, essentially monitor cyclic changes of deep water advection in response to climatic oscillations. Kaolinite and chlorite are of most reliable palaeoceanographic significance. Chlorite originates from southern high-latitudes (Antarctic Peninsula, Patagonia) and is transported and distributed by northward advection of southern-source deep water. By relating kaolinite/chlorite ratios in modern deep-sea sediments to the present-day deep water distribution, a model of past deep water advection may be inferred from downcore variations of kaolinite/chlorite ratios. Thus, northern-source water reaches not further south than 40°S during glacial maxima. During interglacial optima northern-source deep water is injected into the southern ocean to latitudes around 55°S. (Auth. mod.)

#### J-57416

Krupitsky, A.E., **Studies of topographic influences on zonally recirculating flows with application to the Antarctic Circumpolar Current**, New York, Columbia University, 1996, 172p., University Microfilms order No. 96-11159, Ph.D. thesis. Refs. p.165-172.

A hierarchy of analytical and numerical models is constructed in order to assess the effects of bottom topography on zonally recirculating flows with application to the Antarctic Circumpolar Current (ACC). The model geometry varies from a periodic zonal channel to a basin with a periodic gap to realistic southern ocean with observed topography. The goal is to better understand the dynamics of the ACC and the results of the existing general circulation models. An asymptotic approximation is found for the total transport of a barotropic fluid in a zonal channel or a basin with a periodic gap on a  $\beta$ -plane when all geostrophic contours are blocked by the solid boundaries. It is shown that to leading order, the transport is independent of friction similar to a western boundary current; it is inversely proportional to the range of values of potential vorticity that exist on both parts of the solid boundary. The momentum input by the wind is balanced by topographic pressure drag. The analytic results are verified by numerical experiments. A linear equivalent barotropic (EB) model is applied to study the effects of the bottom topography  $H$  and baroclinicity on the total transport and the position of the ACC. It is found that the EB model reproduces the major observed features of the ACC, including the position and the transport of the ACC, reasonably well. (Auth. mod.)

#### J-57421

Rintoul, S., Meyers, G., Church, J., Godfrey, S., Moore, M., Stanton, B., **Ocean processes, climate and sea level**, Greenhouse: coping with climate change. Edited by W.J. Bouma, G.I. Pearman and M.R. Manning, Collingwood, CSIRO Australia, 1996, p.127-144, Refs. p.142-144.

#### DLC QC981.8.C5G728 1996

The oceans store and transport vast quantities of heat, water and carbon. As a consequence, the rate and regional distribution of climate change on time scales longer than months is dominated by ocean processes. Changes in ocean circulation can have a strong impact on regional climate. Sea surface temperature variations in the Pacific and Indian oceans, for example, are correlated with Australian rainfall. Sea surface temperature is, in turn, sensitive to changes in ocean circulation. Recent improvements in the correction of tide gauge observations for land motion has resulted in a consistent record of historical sea-level rise. Forecasts of future sea-level rise due to thermal expansion of the ocean have been improved by taking

into account the fact that heat enters the ocean primarily by advection rather than diffusion. Effects of changes in the formation rate and transport of Antarctic Intermediate Water are discussed. (Auth. mod.)

#### J-57442

Stambler, N., Lovengreen, C., Tilzer, M.M., **Underwater light field in the Bellingshausen and Amundsen Seas (Antarctica)**, *Hydrobiologia*, Jan. 31, 1997, Vol.344, p.41-56, 39 refs.

The aim of this study was to characterize the light environment within the open ocean in Bellingshausen and Amundsen Seas, to determine how the measured chlorophyll concentration influences the underwater light field, and then estimate phytoplankton biomass from the light field data. Downwelling irradiance spectra, upwelling radiance spectra, and attenuation coefficients for downwelling irradiance are shown. The variations of radiance reflectances with wavelength and depth were correlated with chlorophyll concentrations. In particular, the contribution of autofluorescence of the chlorophyll to the underwater light climate was analyzed. In addition underwater UV-A data for this area are presented. These parameters, which describe the underwater light field in quantitative terms, are necessary for optical type classification as well as for models to be developed for remote sensing. (Auth. mod.)

#### J-57473

Trathan, P.N., Brandon, M.A., Murphy, E.J., **Characterization of the Antarctic Polar Frontal Zone to the north of South Georgia in summer 1994**, *Journal of geophysical research*, May 15, 1997, 102(C5), p.10,483-10,497, 42 refs.

The Polar Front (PF) forms the southern boundary to the Polar Frontal Zone (PFZ) along the northern edge of the Antarctic Circumpolar Current (ACC). In a number of areas the position of the PF (and thus the PFZ) is known to be influenced by topographic steering, while local bathymetry has also been implicated in the movement and retention of various associated mesoscale features. This paper examines the structure and position of the PF as it passes over the rugged bathymetry to the north of the Scotia Sea. Results are presented from an oceanographic transect crossing the PF to the northwest of South Georgia and from a pair of shorter transects south of the PF but north and east of the first. Associated with the PF was a narrow, high-speed flow embedded in broader, slower moving regions. The area where these two flows meet was found to be variable over the 30-day timescale of the cruise. This area is known to be of major biological significance, and variability in the local oceanography is possibly of crucial importance to many predator species breeding at the northern end of South Georgia. (Auth. mod.)

#### J-57527

Zielinski, U., Gersonde, R., **Diatom distribution in southern ocean surface sediments (Atlantic sector): implications for paleoenvironmental reconstructions**, *Palaeogeography, palaeoclimatology, palaeoecology*, Apr. 1997, 129(3-4), p.213-250, Refs. p.246-250.

A study of 230 surface sediment samples collected in the Atlantic sector of the southern ocean between the southernmost Weddell Sea and the subtropical zone documents the modern distribution of diatoms revealing patterns of paleoenvironmental significance. Estimations of diatom valves per gram dry sediment display numbers of  $(50-200) \times 10^6$  in the zone of high opal burial located between the mean position of the winter sea ice edge and the Polar Front and maximum values of greater than  $200 \times 10^6$  in the near-shore sedimentary basins off the Antarctic Peninsula. Lowest diatom concentrations and assemblages strongly affected by dissolution were encountered in the Weddell Basin. Despite alteration of the diatom assemblages prior to their incorporation into the sediment record, the biogeographic distribution and the abundance pattern of most of the 35 studied diatom species shows a close relationship with the surface hydrography (water temperature). These relationships can be used to estimate past surface water temperatures based on statistical treatments of the assemblages or on simple relations of species occurrences in the geological record. Another close link occurs between the distribution of sea ice and sea ice related diatoms. (Auth. mod.)

#### J-57532

Duffy, P.B., Caldeira, K., **Sensitivity of simulated salinity in a three-dimensional ocean model to upper ocean transport of**



**salt from sea-ice formation**, *Geophysical research letters*, June 1, 1997, 24(11), p.1323-1326, 30 refs.

The authors show that explicit representation of sinking of salt rejected during sea-ice formation dramatically improves simulated salinity in an ocean general circulation model (OGCM). In a "control" simulation, rejected salt goes into the top model layer, and simulated salinities are typical of OGCMs: the deep ocean is too fresh, and the intermediate-depth salinity minimum associated with Antarctic Intermediate Water is absent. These problems are eliminated in the "test" simulation, in which rejected salt is uniformly distributed over the upper 160 m. Also, the strength of the Antarctic Circumpolar Current is more realistic in this simulation. These results show the need for, but do not provide, a better representation of sinking of rejected salt. The sensitivity of this model to sinking of rejected salt suggests that a similar sensitivity may exist in the real ocean, and that loss of antarctic sea ice might have major effects. (Auth. mod.)

#### J-57539

Oszkó, L., **Tectonic structures and glaciomarine sedimentation in the southeastern Weddell Sea from seismic reflection data** [Tektonischer Aufbau und glaziomarine Sedimentation im südöstlichen Weddellmeer nach reflexionsseismischen Untersuchungen], *Berichte zur Polarforschung*, 1997, No.222, 153p., With German summary. Refs. p.143-153.

This thesis addresses the glaciomarine sedimentation and early tectonic history of the southeastern Weddell Sea and proposes a model from the analysis of more than 25,000 km multichannel seismic data. The proposed seismic stratigraphic model includes the results of piston coring, drilling and bathymetric surveys. The tectonic interpretation was further supported by the compilation of published marine and satellite gravity surveys and magnetic anomaly maps. (Auth. mod.)

#### J-57567

Rakusa-Suszczewski, S., **Spatial and seasonal variability of temperature and salinity in Bransfield Strait and Admiralty Bay, Antarctica**, *Polish polar research*, Dec. 1996, 17(1-2), p.29-42, With Polish summary. Refs. p.41-42.

Comparison of T and S values in areas 1,2, and 3 in the Bransfield Strait and Admiralty Bay shows that the warmest waters are found in area 1, while the coldest in area 3. Surface salinity is the lowest in area 2 as a result of water outflow from land. In area 3 vertical salinity variations are the lowest, with the maximum occurring at the surface. At 500 m depth the highest salinity is recorded in area 1. The most homogeneous distribution of temperature and salinity is observed in area 3. In Admiralty Bay, in the annual cycle of 1995 water temperatures at 4, 10 and 100 m are similar to those in 1979 except in the winter, when they are lower. (Auth.)

#### J-57568

Gurgul, H., Stochmal, W., Szymczak, W., **Annual course of superficial water temperature in the Ezcurra Inlet, King George Island, Antarctica**, *Polish polar research*, Dec. 1996, 17(1-2), p.43-59, With Polish summary. 19 refs.

Temperature of superficial water in the Ezcurra Inlet was measured from Mar. 1989 to Feb. 1990, with a use of a mercurial thermometer with accuracy  $\pm 0.1^\circ\text{C}$ . Temperature was measured usually once a month at selected points. Influence of various factors on temperature of superficial water was preliminarily analyzed. Basing on these results, temperature distribution in the mentioned area was determined. Mean yearly temperatures for each station, average space temperatures on measurement days and mean yearly temperatures for the whole area of the Ezcurra Inlet were calculated. (Auth.)

#### J-57570

Cleveland, L., et al, **Toxicological and chemical screening of Antarctica sediments: use of whole sediment toxicity tests, Microtox, Mutatox and semipermeable membrane devices (SPMDS)**, *Marine pollution bulletin*, Mar. 1997, 34(3), p.194-202, 43 refs.

Eight whole sediment samples from Antarctica, 4 from Winter Quarters Bay and four from McMurdo Sound were evaluated. Also, the influence of ultraviolet radiation on the toxicity and bioavailability of contaminants associated with the sediment samples was assessed. Winter

Quarters Bay sediments contained about 250 ng/g (dry weight) total PCBs and 20  $\mu\text{g/g}$  total PAHs. These sediments elicited toxicity in a Microtox test and avoidance and inhibited burrowing in the *L. plumulosus* test. The McMurdo Sound sediment samples contained only trace amounts of PCBs and no PAHs, and were less toxic in both the *L. plumulosus* and Microtox tests compared to the Winter Quarters Bay sediments. The sediments from McMurdo Sound apparently contained some unidentified substance which was photolytically modified to a more toxic form. The photolytic modification of sediment-associated contaminants, coupled with the polar ozone hole and increased incidence of ultraviolet radiation could significantly increase hazards to antarctic marine life. (Auth. mod.)

#### J-57611

Tanoue, E., Ishii, M., Midorikawa, T., **Discrete dissolved and particulate proteins in oceanic waters**, *Limnology and oceanography*, Sep. 1996, 41(6), p.1334-1343, 26 refs.

Dissolved and particulate proteins were extracted from samples of surface seawater collected from the equatorial area, through the Indian Ocean, to the antarctic ocean. Dissolved and particulate proteins with a wide range of molecular masses were detected by sodium dodecylsulfate-polyacrylamide gel electrophoresis (SDS-PAGE). The particulate proteins were made up of many background proteins of overlapping molecular weight. Distinct bands of individual proteins with apparent molecular masses of ca. 66 and 45 kDa were evident among the background proteins. Electrophoretograms of dissolved proteins were quite different from those of the particulate proteins. Dissolved proteins with apparent molecular masses of 48 and 37 kDa were commonly found as major proteins in all samples examined. Such molecular characteristics of dissolved and particulate proteins are consistent with previous results from the North Pacific. Thus, it appears that the processes by which specific proteins from marine organisms are transferred to and accumulated in the pools of dissolved and particulate organic matter are identical throughout the world's ocean. (Auth. mod.)

#### J-57616

Fabiano, M., et al, **Short-term variations in particulate matter flux in Terra Nova Bay, Ross Sea, Antarctica**, *Antarctic science*, June 1997, 9(2), p.143-149, Refs. p.148-149.

The summer organic matter flux through the water column was measured at 40 m depth in Terra Nova Bay. Water samples and material from a sediment trap on the sea-bottom were analyzed for their biochemical composition. A close coupling between biochemical composition of the organic matter in the water column and the material collected in the sediment trap was found, resulting from complex interactions between physical and biological processes. The physical processes are related to break-up and melting of the ice cover and occur mainly in the early summer season, whilst biological processes play a key role in mid summer and, from the evidence from faecal pellets, are related to the primary production and consumption processes. (Auth.)

#### J-57623

Johnson, M.R., Smith, A.M., **Seabed topography under the southern and western Ronne Ice Shelf, derived from seismic surveys**, *Antarctic science*, June 1997, 9(2), p.201-208, Refs. p.207-208.

Seismic reflection measurements of ice thickness and water-column thickness have been made over the southern and western Ronne Ice Shelf, from which the seabed elevation has been determined. A 2300 km traverse, covering an area over which little bathymetric data previously existed and at a station interval of 15 km, resulted in 152 new measurements of the seabed elevation. With the addition of the new data there is now complete coverage of the seabed elevation and water-column thickness for Ronne Ice Shelf at a spatial resolution of between 10-100 km. The seabed in the area to the south of Korff and Henry ice rises and the Doake Ice Rumples is about 100 m shallower than had previously been speculated, which will affect the validity of previous assumptions of water circulation and ice-ocean interaction in this area. (Auth. mod.)

#### J-57651

Walter, H.J., Van der Loeff, M.M.R., Hoeltzen, H., **Enhanced scavenging of  $^{231}\text{Pa}$  relative to  $^{230}\text{Th}$  in the South Atlantic south of the Polar Front: implications for the use of the  $^{231}\text{Pa}$**



**<sup>230</sup>Th ratio as a paleoproductivity proxy, *Earth and planetary science letters*, June 1997, 149(1-4), p.85-100, 53 refs.**

High <sup>231</sup>Pa/<sup>230</sup>Th ratios, conventionally interpreted as a high-productivity signal, were observed in surface sediments south of the Polar Front, especially throughout the Weddell Sea, in contradiction to the low particle flux of this region. Measurements of both dissolved and particulate fractions of <sup>231</sup>Pa and <sup>230</sup>Th in the water column revealed a strong N-S decrease in the Th/Pa fractionation factor, from typical open ocean values around 10 north of the Polar Front to values between 1 and 2 south of 60°S. This observation clearly indicates that the high <sup>231</sup>Pa/<sup>230</sup>Th ratios in surface sediments south of the Antarctic Circumpolar Current are produced by a N-S increase in the relative scavenging efficiency of <sup>231</sup>Pa relative to <sup>230</sup>Th, most probably due to a change in the chemical composition of particulate matter, and not by a high mass flux. Based on these results the authors conclude that, in regions where the sedimenting flux is dominated by biogenic opal, the <sup>231</sup>Pa/<sup>230</sup>Th ratio is not a reliable indicator for the mass flux of particles, thus limiting its use as a paleoproductivity proxy in the southern ocean. (Auth. mod.)

#### J-57659

Tanimura, A., Hattori, H., Fukuchi, M., **Surface chlorophyll *a* measured continuously in the Indian antarctic water in summer 1985/86, *Antarctic record*, Nov. 1996, 40(3), p.314-320, With Japanese summary. 14 refs.**

Temporal and spatial variations of phytoplankton chlorophyll *a* concentration together with the variations of oceanographic parameters were studied with an automated data acquisition system, which was newly designed and installed on board the Japanese icebreaker *Shirase*. Variations of chlorophyll *a* concentration across three oceanic frontal zones (Subtropical Convergence, Subantarctic Front and Polar Front) in the Indian sector of the antarctic ocean showed positive and/or negative correlations with the oceanographic parameters. Temporal variations of chlorophyll *a* concentration at a fixed point in coastal fast ice area in the Ongul Strait showed a negative correlation with nutrient salts. (Auth.)

#### J-57676

Howe, J.A., Pudsey, C.J., Cunningham, A.P., **Pliocene-Holocene contourite deposition under the Antarctic Circumpolar Current, Western Falkland Trough, South Atlantic Ocean, *Marine geology*, Apr. 1997, 138(1-2), p.27-50, Refs. p.49-50.**

The eastward-flowing Antarctic Circumpolar Current (ACC) has influenced sedimentation on the slope and floor of the western Falkland Trough, where the axis of the current is topographically constrained. Deep-water flow has produced a symmetrical sediment drift on the trough floor, with non-depositional margins indicating higher current velocities at the base of slope. To the southeast of the Falkland Is. there is a gap in the North Scotia Ridge, north of which the floor of the trough is swept clean of sediment by the ACC. Both echo character mapping and GLORIA side-scan data indicate that currents follow the bathymetric contours along the slope, redistributing sediment and locally eroding furrows. From six cores on the drift and on the northern slope, two styles of contourite deposition have been identified. Pliocene and Mid-Pleistocene glaucony-rich sandy contourites containing radiolaria characterize the Falkland Plateau and the floor of the trough near the gap in the North Scotia Ridge. It is suggested that the glaucony is derived from a combination of authigenic formation and erosion of locally outcropping Cretaceous and Tertiary strata; this is supported by dinoflagellate analysis. (Auth. mod.)

#### J-57684

Cripps, G.C., Shears, J., **Fate in the marine environment of a minor diesel fuel spill from an antarctic research station, *Environmental monitoring and assessment*, July 1997, 46(3), p.222-232, 13 refs.**

Monitoring was undertaken of the marine environment after an accidental oil spill near Faraday Station in Mar. 1992. On the day after the incident concentrations in seawater reached a maximum of 540 µg/l. However, concentrations returned to local background levels within one week. The fuel had an immediate toxic effect on intertidal limpets in the local station area, and 100 animals were found dead the day after the spill. Surviving animals had elevated concentrations of both n-alkanes and polycyclic aromatic hydrocarbons (PAH) for over a month after the spill. This was the result of accumulation from a residue of the diesel being flushed

by rainwater into the littoral zone. Seven months after the spill concentrations of both n-alkanes and PAH in limpets living close to the station were still an order of magnitude greater than those found in animals at an uncontaminated control site. The diesel spill itself had a very minor, localized and short-term impact on the antarctic marine environment. (Auth. mod.)

#### J-57711

Gille, S.T., **Why potential vorticity is not conserved along mean streamlines in a numeric southern ocean, *Journal of physical oceanography*, July 1997, 27(7), p.1286-1299, 29 refs.**

Potential vorticity (PV) is used as an indicator of the forcing processes and dissipation at work in the southern ocean. Numerical results are compared with hydrographic measurements. Although simple hypotheses might suggest that subsurface PV should be unaffected by wind forcing and constant along streamlines, these results indicate that even at about 1000-m depth, PV varies along mean streamlines in both the numerical model output and in the in situ observations. The changes in PV are largely represented by stratification changes rather than shifts in the Coriolis parameter or in relative vorticity. In the numerical model output, a combination of mechanisms is responsible for these changes in PV, including transient tracer fluxes, transient momentum fluxes, diffusive processes, and long-term tracer drift. (Auth. mod.)

#### J-57718

Maslennikov, V.V., **Differentiation of antarctic waters and effects on the distribution of some fish and plankton species [Differentsiatsiia vod Antarktiki s uchetom ikh vozdeistviia na raspredelenie nekotorykh vidov planktona i ryb], *Antarktika*, 1995, No.33, p.43-53, In Russian with English summary. 25 refs.**

The author describes the spatial structure of the water masses between Antarctica and the Southern Polar Frontal Zone using data from the literature and from various VINRO Antarctic Expeditions. The frontal zones and different characteristics of the water masses are given, together with an analysis of the relationship between the spatial structure of antarctic water masses and abundances and limits of mass distribution of antarctic krill (*Euphausia superba* Dana) and the myctophid fish *Electrona carlsbergi*. (Auth. mod.)

#### J-57729

Stevens, D.P., Ivchenko, V.O., **Zonal momentum balance in an eddy-resolving general-circulation model of the southern ocean, *Royal Meteorological Society. Quarterly journal B*, Apr. 1997, 123(540), p.929-951, Refs. p.949-951.**

The momentum balance in the zonally unbounded region of the southern ocean is examined using an eddy-resolving ocean general-circulation model. Momentum, which is input at the surface and accelerates the Antarctic Circumpolar Current, is transferred down the water column and removed by topographic form stress. Bottom friction and lateral eddy viscosity are found to be negligible. The poleward flux of eastward momentum has a small effect in redistributing momentum. The downward transfer of momentum is achieved by interfacial form stress. This can be understood in terms of a poleward density (heat) flux. The main contribution comes from standing eddies, with a smaller contribution from transient eddies. Both contributions assist the transfer. The flux of density (heat) from the neighboring oceans (to the north and south of the Drake Passage latitudes) influences the depth penetration of zonal momentum, particularly in the upper 1000 m. (Auth. mod.)

#### J-57734

Holm-Hansen, O., Hewes, C.D., Villafañe, V.E., Helbling, E.W., Silva, N., Amos, T., **Distribution of phytoplankton and nutrients in relation to different water masses in the area around Elephant Island, Antarctica, *Polar biology*, Aug. 1997, 18(2), p.145-153, 19 refs.**

During Jan.-Mar. 1996, the U.S. Antarctic Marine Living Resources program carried out an extensive multidisciplinary study in a 40,000 km<sup>2</sup> sampling grid around Elephant I. The physical, chemical, optical, and biological characteristics of the upper water column were determined at 91 hydrographic stations. Analysis of the temperature and salinity data showed that 6 different hydrographic zones could be differentiated. The biological (phytoplankton distribution and abundance) and chemical (inorganic nutrient concentrations) data also showed characteristic differ-



ences within each of these 6 zones. Relatively low and deeply distributed phytoplankton abundance was found at all stations in the southeastern portion of the sampling grid. The areas of enhanced phytoplankton biomass in the AMLR sampling grid roughly correspond to the areas where krill are generally also found in greater abundance. The overall biological productivity of the Elephant I. region would thus appear to be dependent upon the circulation patterns of the major water masses that intrude into this area. (Auth. mod.)

#### J-57759

Meredith, M.P., Vassie, J.M., Spencer, R., Heywood, K.J., **Processing and application of inverted echo sounder data from Drake Passage**, *Journal of atmospheric and oceanic technology*, Aug. 1997, 14(4), p.871-882, 31 refs.

Bottom pressure recorders (BPRs) have been deployed at Drake Passage to monitor changes in the volume transport of the Antarctic Circumpolar Current (ACC) through the passage. The use of inverted echo sounders (IESs) in assisting the interpretation of the BPR data is presented. The initial data processing of the IES data is outlined, and the accuracy of the data described. IES data are shown to perform well at determining whether individual changes in bottom pressure are due to changes in cross-passage-averaged barotropic transport or due to the effect of meanders, eddies, and/or lateral shifts of ACC fronts. The conversion of acoustic travel time to more useful oceanographic parameters (dynamic height, baroclinic pressure, inverse-barometer-corrected sea level) is described. A method for improving the performance of very deep bottom pressure in monitoring ACC barotropic transport changes is described and reasons for the inability of this method to improve the ability of shallower pressure records in monitoring the ACC are discussed. (Auth. mod.)

#### J-57770

Gurgul, H., Stochmal, W., Rakusa-Suszczewski, S., **Inorganic suspension in waters of the Admiralty Bay in a year cycle (King George, South Shetland, Antarctica)**, *Quaestiones geographicae*, 1991/1992 (Pub. 1995), No.17/18, p.13-23, 23 refs.

#### DLC G1.Q3 1995

Inorganic suspension concentrations in Admiralty Bay and in surface waters of Ezcurra Inlet were investigated from Feb. 1, 1989 to Mar. 1, 1990. The main source of suspensions was found to be glacier underflow, with the highest concentrations occurring at the end of Feb. and beginning of Mar., and in May, exceeding  $10^3 \text{ kg/m}^3$ . The lowest occurred in Aug. and Sep. ( $<10^5 \text{ kg/m}^3$ ). Suspension concentrations decreased according to the distance from flow outlets. (Auth. mod.)

#### J-57788

Mahapatra, K., Matsumura, S., Kawaguchi, S., Senga, Y., **Bio-optical relationships in south-west Atlantic sector of antarctic ocean**, *SPIE-The International Society for Optical Engineering. Proceedings*, 1997, Vol.2963, Ocean optics 8. Edited by S.G. Ackleson et al, p.495-501, 5 refs.

#### DLC GC177.6.O27 13

Optical and phytoplankton pigment data collected from around 80 stations in the southwest Atlantic sector of the antarctic ocean, between the Drake Passage and Antarctic Peninsula, during three Antarctic Expeditions of Japan Fisheries Agency in austral summer were analyzed for bio-optical characterization. Three optical water types were identified based on the spatial variability of phytoplankton pigment in the euphotic zone and corresponding profile of physical parameters along with total beam attenuation coefficient and diffuse attenuation coefficient. The results point to the need of more critical study on the bio-optical aspects before implementation of local algorithms for this region on ocean color image. (Auth. mod.)

#### J-57802

Schneider, D., **Rising seas**, *Scientific American*, Mar. 1997, 276(3), p.112-117.

Scientists began warning more than 20 years ago that global warming might cause a precariously placed store of frozen water in Antarctica to melt, leading to a calamitous rise in sea level—perhaps 5 or 6 m worth. Yet predicting exactly how—or whether—sea level will shift in response to global warming remains a significant challenge. Scientists trained in many separate disciplines are attempting to glean answers using a variety of

experimental approaches, ranging from drilling into the antarctic ice cap to bouncing radar off the ocean from space. With such efforts, investigators have learned a great deal about how sea level has varied in the past and how it is currently changing. For example, most of these scientists agree that the ocean has been creeping upward by 2 mm a year for at least the past several decades. But determining whether a warmer climate will lead to a sudden acceleration in the rate of sea level rise remains an outstanding question. (Auth. mod.)

#### J-57803

Seiß, G., Schröter, J., Guretskii, V.V., **Assimilation of Geosat altimeter data into a quasigeostrophic model of the Antarctic Circumpolar Current**, *Monthly weather review*, July 1997, 125(7), p.1598-1614, 42 refs.

To study the relationship between mesoscale variability and the mean circulation of the Antarctic Circumpolar Current, the authors have assimilated Geosat altimeter measurements into a quasigeostrophic model of the southern ocean. The model is eddy resolving and includes realistic lateral boundaries and bottom topography. The method of “nudging” is applied for a continuous assimilation of the satellite data. When sea surface height is nudged into the model instead of vorticity, a fast convergence toward observations is found. However, when the technique that was proven successful in identical twin experiments is used with real data, it is observed that there is only slight improvement. The success of the assimilation is restricted mainly to driving the variability of the model closer to the observations. Additionally, in the ice-covered domain of the southern ocean, which is modeled but not constrained by Geosat observations, the authors find a major improvement. The overestimation of the westward current around Antarctica is reduced significantly. (Auth. mod.)

#### J-57848

García, M.A., López, O., Sospedra, J., Espino, M., Rojas, P., S. Arcilla, A., **Physical oceanography of the Bransfield Strait, 1993** [Oceanografía física del Estrecho de Bransfield durante la campaña Bioantar 93], *Actas del V Simposio Español de Estudios Antárticos*. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.355-376, In Spanish with English summary. 10 refs.

The BIOANTAR 93 oceanographic cruise was carried out between Jan. and Feb., 1993. The study area comprised the Bransfield and Gerlache straits. A number of wave buoys, current meter arrays and tide gauges were deployed at selected locations within the western and central basins of the Bransfield Strait. The field work was performed with the support of R/V *Hesperides*. The network of CTD stations allowed the study of mesoscale structures. Repeated profiling provides evidence of vertical mixing processes and of energetic internal tidal motions. Tabulated data are presented. (Auth. mod.)

#### J-57849

Julia, A., **Temperature distribution in the Bransfield Strait, summer 1986** [Distribución de la temperatura en el Estrecho de Bransfield. Verano de 1986], *Actas del V Simposio Español de Estudios Antárticos*. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.377-387, In Spanish with English summary. 6 refs.

Temperature data are presented obtained with disposable probes in the area parallel to the central longitudinal axis of the Bransfield Strait and in the area bordering the Atlantic Ocean. The vertical distribution of temperature during spring and summer is compared. In waters near the South Shetland Is., at depths around 300 m, a  $>0^\circ\text{C}$  temperature was recorded, suggesting a mixing process with the deep circumpolar current flow. Waters between the Antarctic Peninsula and King George I. show a lower temperature, suggesting they originated in the Weddell Sea. (Auth. mod.)

#### J-57850

López, O., García, M.A., S. Arcilla, A., **Tides and circulation in the Bransfield Strait in summer 1992-1993** [Marea y circulación mareal en el Estrecho de Bransfield durante el verano austral 92/93], *Actas del V Simposio Español de Estudios Antárticos*.



(Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.389-401, In Spanish with English summary. 12 refs.

During the 1992-93 Spanish expedition to Antarctica, 3 current meter moorings and 3 tide gauges were deployed at different locations within the Bransfield Strait. The time series of sea level data from the tide gauges, which were located at coastal domains of Low, Livingston and King George islands, show that the tidal range is 2.0 to 2.4 m. Analysis of the current velocity data reveals that the circulation in the Bransfield Strait is strongly affected by tides. The diurnal and semidiurnal periodicity of the flow is very obvious at all levels. At the 400 m depth, velocity values were up to 0.43 m/s at the central most mooring location. Average velocities of residual circulation were between 0.04 and 0.10 m/s, with maximum velocity values at 0.17 to 0.20 m/s. The direction of the residual flow is in agreement with the geostrophic calculations calculated by other authors. (Auth. mod.)

#### J-57851

Rojas, P., et al, **Hydrography of the Bransfield Strait in summer 1991-1992** [Hidrografía del Estrecho de Bransfield durante el verano austral 91/92], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.403-411, In Spanish with English summary. 5 refs.

Hydrographic data collected between Dec. 9 and 30, 1991, at 38 CTD stations located in the western and central basins of the Bransfield Strait, are presented. Both the CTD profiles and the TS diagrams show the confluence of different water masses in the Strait: the Weddell Sea water, which is cold and salty, and the relatively warm freshwater inflow from the Bellingshausen Sea. At depths between 300 and 500 m, the inflow of the Circumpolar Deep Water (CDW), salty and extremely warm when compared with water masses of the central Bransfield basin, is observed between Smith and Snow islands. Below the 400-m-depth layer, a very homogeneous water mass, with temperatures below -1.00°C and salinity around 34.5 psu, is found. (Auth. mod.)

#### J-57852

Garcia, V., Sospedra, J., **Hydrography of the Johnsons Dock** [Estudio hidrográfico de Cala Johnson], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.413-420, In Spanish with English summary. 1 ref.

The Johnsons Dock is an embayment 750 m long, located in South Bay, where 3 hydrographic surveys were performed, under different tidal conditions, between Dec. 1992 and Jan. 1993. Results show a complex structure influenced by both the fresh water input due to ice melting and hydraulic exchanges with the Bay. These exchanges which are mainly driven by tides, are the most relevant factors controlling the hydrography of Johnsons Dock. (Auth. mod.)

#### J-57881

Grosfeld, K., Gerdes, R., Determann, J., **Thermohaline circulation and interaction between ice shelf cavities and the adjacent open ocean**, *Journal of geophysical research*, July 15, 1997, 102(C7), p.15,595-15,610, 35 refs.

Applying a three-dimensional ocean general circulation model to an idealized ice shelf cavity geometry coupled with an open ocean at a topographic ice shelf barrier, the authors found an important parameter controlling the interaction between these two systems. Idealized studies for different ice shelf and sea bottom topographies and forcing mechanisms for the open ocean show that the ice shelf edge represents a natural barrier for barotropic interaction, because of the sudden decrease in water column thickness. An increased barotropic current can surmount the ice edge and ventilate the water mass beneath the ice shelf only at lateral sloping side-walls or at deep depressions, which can be found, for example, in the southern Weddell Sea. In all other cases the circulation in the ice shelf cavity is closed and almost unaffected by the hydrography outside the barrier. (Auth. mod.)

#### J-57888

Suzuki, T., Fukuchi, M., **Chlorophyll *a* concentration measured with a continuous water monitoring system during the cruise to Syowa Station, Antarctica, JARE-27 (1985/86) to JARE-35 (1993/94)**, Tokyo, Center for Antarctic Environment Monitoring. National Institute of Polar Research, 1997, 60p., Refs. p.10-12.

Surface chlorophyll *a* measurements were carried out on board the icebreaker *Shirase* as one of routine observations of the Japanese Antarctic Research Expedition (JARE) since 1965. This report describes how data collected from JARE-27 to JARE-35, and edited by the authors onto a CD-ROM, may be accessed and easily manipulated with a personal computer. A block diagram of the surface-water monitoring system is shown in a figure. Tabulated data, and charts showing longitudinal variations of water temperature, salinity, and chlorophyll *a*, collected between Tokyo and Showa Station, are presented.

#### J-57898

Hulth, S., Tengberg, A., Landén, A., Hall, P.O.J., **Mineralization and burial of organic carbon in sediments of the southern Weddell Sea (Antarctica)**, *Deep-sea research I*, June 1997, 44(6), p.955-981, 71 refs.

Benthic fluxes of oxygen, alkalinity ( $A_T$ ), total carbonate ( $C_T$  or  $\Sigma CO_2$ ) and dissolved organic carbon (DOC) were measured during sediment-water incubations at 16 stations in the southern Weddell Sea with water depths between 280 and 2514 m. The total sediment oxygen consumption rates (TSOC) were in general low and more comparable to measurements in slope and deep-sea sediments at a few thousand meters water depth. Benthic mass balances of carbon revealed that benthic fluxes of DOC were 3-147% of the corrected fluxes of  $\Sigma CO_2$ , and the recycling efficiencies (E) were up to 35% higher if the DOC fluxes were included in the calculations of E, rather than the inorganic  $\Sigma CO_2$  flux alone. The recycling efficiencies, including the benthic flux of DOC, ranged between 57 and 88% (mean 78%). Measured rates of inorganic C accumulation were a factor of 6-7 lower than organic C accumulation rates. (Auth. mod.)

#### J-57920

Friedrich, J., **Natural tracers in the ACC and Weddell Sea** [Polonium-210 und Blei-210 im Südpolarmeer: Natürliche Tracer für biologische und hydrographische Prozesse im Oberflächenwasser des Antarktischen Zirkumpolarstroms und des Weddellmeeres], *Berichte zur Polarforschung*, 1997, No.235, 155p., In German with English and German summaries. Refs. p.137-146.

The distribution of  $^{210}Po$  and  $^{210}Pb$  in the upper 600 m of the Antarctic Circumpolar Current (ACC) and the Weddell Sea was investigated along north-south transects in the austral spring and autumn.  $^{210}Po$  and  $^{210}Pb$  can serve as sensitive tracers for the special hydrographic conditions of the ACC and the Weddell Sea as well as for biological processes during phytoplankton blooms. The  $^{210}Po/^{210}Pb$  disequilibrium was used as a tracer for particle export. This tracer integrates export on a timescale of 276 days because of the 138 day half-life of  $^{210}Po$  and complements the  $^{234}Th/^{238}U$  disequilibrium as another tracer for plankton production and export on a shorter timescale of several weeks. (Auth.)

#### J-58023

Ohshima, K.I., Takizawa, T., Ushio, S., Kawamura, T., **Seasonal cycle of the antarctic coastal ocean**, *Antarctic record*, Mar. 1997, 41(1), p.311-328, In Japanese with English summary. Refs. p.327-328.

Year-round oceanographic observations were conducted in the vicinity of Lützow-Holm Bay during 1990-92. It was found that the thickness of the Winter Water (WW) layer, characterized by a cold fresh oxygen-rich water, exhibits its maximum in the fall (typically 500 m) and its minimum in the summer (typically 350-400 m). The associated density variation of the water column suggests a large seasonal variation in barotropic coastal flow. Prominent freshening occurs in the WW layer in the fall. It is proposed that the seasonal variation in the WW layer is mainly caused by the seasonal variation in the wind over coastal waters. In the fall, the prevailing easterly wind intensifies, which increases the Ekman convergence of WW in the coastal area, while in the summer the opposite occurs. (Auth. mod.)



**J-58049**

Torres N., D., Jorquera F., D., **Monitoring results of marine debris at Cape Shirreff, Livingston Island, South Shetland Islands, during the Antarctic season 1995/96**, *Santiago de Chile. Instituto Antártico Chileno. Serie científica*, 1996, No.46, p.121-132, With Spanish summary. 6 refs.

The principal results of the monitoring survey on marine debris carried out at Cape Shirreff during the 1995-96 season are given. A total of 4,251 articles, weighing 65.8 kg, were obtained. Plastic material was the principal item (4,015 pieces), followed by glass (147 pieces), metal (77 pieces), and paper (12 pieces). Of the plastic items, those used in fisheries consisted of 1,195 articles (strapping bands and net pieces). The total density of marine debris collected on the site has increased from 0.65 articles/m<sup>2</sup> in 1993-94 to 1.02 in 1994-95, and 1.52 in 1995-96. Four specimens of *Arctocephalus gazella*, caught in plastic neck collars, were observed and immobilized; the collars were removed and the animals were released back into the sea. (Auth. mod.)

**J-58052**

Sepúlveda, H.H.A., Marín, V.H., **Circulation modeling and use of resources on INTERNET** [Modelación numérica de la circulación en la plataforma norte de las Islas Shetland del Sur: un ejemplo sobre el uso de recursos en INTERNET], *Santiago de Chile. Instituto Antártico Chileno. Serie científica*, 1996, No.46, p.161-170, In Spanish with English summary. 8 refs.

INTERNET is described as the most powerful and extensive global communications network. This article illustrates the use of this communication system in scientific research in Antarctica. An annotated list of 18 WEB addresses, with antarctic scientific information, is included. (Auth.)

**J-58087**

Gille, S.T., **Southern ocean momentum balance: evidence for topographic effects from numerical model output and altimeter data**, *Journal of physical oceanography*, Oct. 1997, 27(10), p.2219-2232, 29 refs.

The momentum balance of the Antarctic Circumpolar Current is investigated using both output from a high-resolution primitive equation model and sea surface height measurements from the Geosat altimeter. Detailed examination of form stress in the model indicates that it is due to three large topographic obstructions located at Kerguelen I., Campbell Plateau, and Drake Passage. The difference between wind stress and form stress represents the lateral transfer of momentum into and out of the ACC. Unresolved transient eddy processes play a critical role in fluxing momentum across the ACC in this model. Elevated levels of eddy kinetic energy are associated with the three major topographic features. In contrast, altimeter data show elevated energy levels at many more topographic features of intermediate scales, suggesting that smaller topographic effects are better able to communicate with the surface in the real ocean than in the model. (Auth. mod.)

**J-58088**

Osborn, T.J., **Thermohaline oscillation in the LSG OGCM: propagating anomalies and sensitivity to parameterizations**, *Journal of physical oceanography*, Oct. 1997, 27(10), p.2233-2255, 47 refs.

New experiments are reported that extend previous studies of the internally generated variability found when the Hamburg LSG Ocean General Circulation Model is integrated under mixed boundary conditions. It is demonstrated that the salinity anomalies that propagate around the meridional circulation of the Atlantic Ocean are merely signals emitted from the source of the variability in the southern ocean; they do not play an active role in its generation. It is the southern ocean flip-flop oscillator, as suggested by a previous study, that is the driving mechanism of the 320-yr period oscillations. A second mode of propagation is identified that may be related to the periodicity of the oscillations: westward propagation of upper-ocean salinity anomalies around the coast of Antarctica. It is shown that this mode is driven by the same density-upwelling wave motion as reported elsewhere in the literature. Changes in surface fluxes implied by the alteration to the model have implications for the flux adjustments necessary when the LSG model is coupled to an atmosphere model. The results presented here indicate considerable scope for reducing such flux adjustments. (Auth. mod.)

**J-58143**

François, R., et al, **Contribution of southern ocean surface-water stratification to low atmospheric CO<sub>2</sub> concentrations during the last glacial period**, *Nature*, Oct. 30, 1997, 389(6654), p.929-935, 28 refs.

The nitrogen-isotope record preserved in southern ocean sediments, along with several geochemical tracers for the settling fluxes of biogenic matter, reveals patterns of past nutrient supply to phytoplankton and surface-water stratification in this oceanic region. Areal averaging of these spatial patterns indicates that reduction of the CO<sub>2</sub> 'leak' from ocean to atmosphere by increased surface-water stratification south of the Polar Front made a greater contribution to the lowering of atmospheric CO<sub>2</sub> concentration during the Last Glacial Maximum than did the increased export of organic carbon from surface to deep waters occurring further north. (Auth.)

**J-58160**

Rintoul, S.R., Donguy, J.R., Roemmich, D.H., **Seasonal evolution of upper ocean thermal structure between Tasmania and Antarctica**, *Deep-sea research I*, July 1997, 44(7), p.1185-1202, 18 refs.

The subantarctic front (SAF) is composed of two parts, which have distinct thermohaline signatures and behave somewhat independently: the northern part, associated with the 6-8°C isotherms, is characterized by large meridional gradients of both temperature and salinity; the southern part is associated with a weaker meridional temperature gradient and negligible salinity gradient between the 3° and 5°C isotherms. The northern part of the SAF is located between 50°S and 51°S, but the position of the southern part of the SAF is more variable with time. The polar front (PF) is found near 53°S. Dynamic height is estimated by exploiting the tight correlation in this region between vertically-integrated temperature and dynamic height. Dynamic height decreases relatively smoothly with latitude between 50°S and 53°S, so that the SAF, PF and the water between the two fronts forms a broad belt of eastward flow relative to a deeper level. (Auth. mod.)

**J-58161**

Sedwick, P.N., Edwards, P.R., Mackey, D.J., Griffiths, F.B., Parslow, J.S., **Iron and manganese in surface waters of the Australian subantarctic region**, *Deep-sea research I*, July 1997, 44(7), p.1239-1253, 48 refs.

These data demonstrate that dissolved Fe concentrations in waters south of the Australian continent between 45 and 53°S are probably low enough to limit primary production. This sector of the southern ocean is thought to be a significant annual sink for atmospheric CO<sub>2</sub>, although at present the relative contributions to this sink from physical and biological processes are not known. The close proximity of the study area and surrounding waters to the arid Australian continent provides potential for episodic transport of Fe-rich dust into the surface ocean, which in sufficient quantities may increase phytoplankton production in what are suggested to be Fe-deficient areas. Such episodic aeolian Fe input and increased biological production might account for some of this proposed atmospheric CO<sub>2</sub> sink. Additional chemical surveys of the region are of interest in order to better characterize the spatial and temporal distribution of bioactive trace metals in the surface ocean.

**J-58168**

Liu, Z.L., Shi, J.X., Chen, Z.Y., Zhu, G.H., Ning, X.R., **Distributions of phytoplankton, size-fractionated chlorophyll *a* and primary productivity in Prydz Bay and the adjacent area during austral summer**, *Chinese journal of polar research*, Mar. 1997, 9(1), p.18-27, In Chinese with English summary. 13 refs.

Size-fractionated chlorophyll *a*, primary productivity, cell abundance, dominant species of phytoplankton and particulate organic carbon were investigated by CHINARE-8 in Prydz Bay and the adjacent area during the summer of 1991-1992. Results show obvious spatial zonation of above parameters in the studied area: high in Zhongshan and Davis Bays, and low in the western region of the surveyed area. The highest concentration of total chlorophyll *a* occurred in Prydz Bay and the adjacent continental shelf. The highest productivity occurred in Zhongshan and Davis Bays. (Auth. mod.)



**J-58171**

Yang, Y.L., Huang, F.P., Wu, B.L., Mu, H.L., **Spatio-temporal variations of environmental factors in intertidal zone in summer in the Fildes Peninsula, Antarctica**, *Chinese journal of polar research*, Mar. 1997, 9(1), p.53-57, In Chinese with English summary. 6 refs.

Environmental factors, such as water temperature, salinity and nutrient salts (in the forms of  $\text{PO}_4\text{-P}$ ,  $\text{NO}_3\text{-N}$  and  $\text{SiO}_3\text{-Si}$ ) in the intertidal zone, in summer, in the Fildes Peninsula region are analyzed. The spatial distribution of water temperature is highest in the high tide area, followed by the mid-tide area and, the lowest, in the low tide area. The length of exposure of the intertidal zone to air temperature is the main factor influencing the water temperature change. The spatial distribution of salinity is lowest in the high tide area followed by the mid-tide area and, the highest, in the low tide area. The amount of snowmelt from land infiltrated into the intertidal zone influences the spatial distribution of salinity in the zone. The spatial distribution of the nutrients in the mid-tide area is lower than that in the low tide area. The nutrients are mostly not terrigenous. (Auth.)

**J-58185**

Zhang, Y.H., Huang, X.B., Wang, W.Q., **Distribution of  $\text{CO}_2$  and its air-sea flux in the Prydz Bay of Antarctica and its adjacent waters**, *Chinese journal of polar research*, June 1997, 9(2), p.158-162, In Chinese with English summary. 9 refs.

The partial pressure of carbon dioxide in surface water and atmosphere, in the Prydz Bay and its adjacent waters, was determined by using infrared analysis from Dec. 1991 to Jan. 1992. Results show that the distribution of  $\text{Pco}_2$  is lower in the coastal waters than in the open sea, and that its distribution is principally controlled by biological activity. The  $\text{CO}_2$  flux was estimated by using the flux model; the mean  $\text{CO}_2$  air-sea flux in the area is about  $-71.9 \text{ g}/(\text{m}^2/\text{a})$ . (Auth. mod.)

**J-58188**

Banse, K., English, D.C., **Near-surface phytoplankton pigment from the Coastal Zone Color Scanner in the Subantarctic region southeast of New Zealand**, *Marine ecology progress series*, Sep. 25, 1997, Vol.156, p.51-66, Refs. p.65-66.

Primarily based on satellite images, the phytoplankton concentration southeast (downstream) of New Zealand, in the High Nitrate-Low Chlorophyll (HNLC) subantarctic water between the Subtropical Convergence (STC) and the Polar Front (PF), is believed to be higher than in the remainder of the Pacific sector. Iron enrichment is assumed to be the reason. To study the question, near-surface phytoplankton pigment estimates from the Coastal Zone Color Scanner for up to 7 yr were reprocessed with particular attention to interference by clouds. (Auth. mod.)

**J-58192**

Stern, M.E., **Splitting of a free jet flowing over a saddle sill**, *Journal of geophysical research*, Sep. 15, 1997, 102(C9), 20,957-20,965, 7 refs.

If a steady jet with two free streamlines ascends a sill while entirely remaining on one sloping side, then the rising motions must be compensated by transverse sinking motions in order that the cross-stream integral of relative vorticity vanishes at all downstream sections. The maximum sill height which allows such a flow is computed assuming slow downstream changes in a quasi-geostrophic barotropic model. If the critical sill height is exceeded, it is suggested that the jet will split with only part of it crossing the sill on the original side. This might explain why the Antarctic Circumpolar Current bifurcates at the Falkland Plateau, where one branch forms the Malvinas Current and the other branch turns eastward across the Atlantic. (Auth. mod.)

**J-58232**

Russin, E.M., Shih, H.H., Edwing, R.F., **Water level measurements in the polar regions: status and technology**, U.S. National Oceanic and Atmospheric Administration. National Ocean Service. Office of Oceanography and Marine Assessment. Technical memorandum, Sep. 1990, NOAA/TM/NOS/OMA-54, 29p. + appends., PB91-113134, 19 refs.

This report is a survey of work that NOS and others are or have been doing in the area of sea level measurements in polar regions, with a special emphasis on the needs of NOAA's Climate and Global Change Program and the Global Sea Level Observing System, known as GLOSS. The report assesses the state-of-the-art technology involved, the potential for future development, and provides recommendations for near and long-term projects. It also recommends that Prudhoe Bay, AK, be established as a pilot station for further investigations into the measurement requirements of other arctic stations and that a cooperative program be initiated with the National Science Foundation for establishing stations in Antarctica. (Auth.)

**J-58267**

Lasnier, P., Hajji, H., Michon, P., **Use of ATSR data for monitoring the Antarctic Convergence Zone**, International Workshop on ERS Applications, 2nd, London, UK, Dec. 6-8, 1995. Proceedings, Noordwijk, European Space Agency, 1996, p.225-228, ESA SP-383, 3 refs.

**DLC QE33.2.A7I58**

The Sea surface temperature measurements retrieved from the ERS-1 Along-Track Radiometer give an excellent opportunity for monitoring the Antarctic Convergence Zone. A comparison between the theoretical and the satellite-observed zones has demonstrated the feasibility of estimating its position and thus supplying more frequent real-time information for sailing boat records. (Auth. mod.)

**J-58269**

Ribbe, J., Tomczak, M., **On convection and the formation of Subantarctic Mode Water in the Fine Resolution Antarctic Model (FRAM)**, *Journal of marine systems*, Oct. 1997, 13(1-4), p.137-154, 37 refs.

The authors investigate the formation of Subantarctic Mode Water (SAMW) in the Fine Resolution Antarctic Model (FRAM). FRAM velocity fields are applied to advect an ideal tracer in an off-line diffusion and advection model of the southern ocean, and the results from two computational experiments are reported. In the first experiment, the tracer was released to the south of the Antarctic Polar Front (APF), in the second experiment to the north of the front, obtaining insight into the SAMW formation process and the relative importance of convection, downwelling, vertical mixing and subduction in FRAM. A quantitative estimate for the amount of antarctic and subantarctic surface water found north of the APF is given. Its contribution to ventilated water in the upper thermocline is significant. (Auth. mod.)

**J-58273**

Hofmann, E.E., Klinck, J.M., Lascara, C.M., Smith, D.A., **Water mass distribution and circulation west of the Antarctic Peninsula and including Bransfield Strait**, *American Geophysical Union. Antarctic research series*, 1996, Vol.70, Foundations for ecological research west of the Antarctic Peninsula. Edited by R.M. Ross, E.E. Hofmann and L.B. Quetin, p.61-80, Refs. p.79-80.

**DLC QH541.264.A6F67 1996**

Historical hydrographic data from Bransfield Strait and the region west of the Antarctic Peninsula were analyzed to provide descriptions of water mass distributions and circulation patterns. Circumpolar Deep Water (CDW), the most prominent water mass in this region, is found between 200 and 700 m, and is present in all seasons throughout the region examined. Below 200 m this water mass floods the continental shelf west of the Antarctic Peninsula. Mixing of CDW results in reduction of the oxygen content of the overlying waters by 25 to 45%. The freshwater input needed to balance the salinity input from CDW is on the order of  $0.63 \text{ m}/\text{y}$ . The annual heat flux associated with CDW is  $12 \text{ W}/\text{m}^2$ . A second prominent water mass, Bransfield Strait Water is found throughout the central and southern portions of the Strait. Surface drifters indicate that the circulation in Bransfield Strait is clockwise and may be continuous with the circulation west of the Antarctic Peninsula above 500 m. The circulation pattern inferred from historical temperature distributions suggests that the westward flowing Polar Slope Current, which has been observed north of the South Shetland Is., does not extent beyond Smith I. (Auth. mod.)



**J-58331**

Camerlenghi, A., Crise, A., Pudsey, C.J., Accerboni, E., Laterza, R., Rebesco, M., **Ten-month observation of the bottom current regime across a sediment drift of the Pacific margin of the Antarctic Peninsula**, *Antarctic science*, Dec. 1997, 9(4), p.426-433, Refs. p.432-433.

The authors present two time series of bottom current and temperature collected 8 m above the seabed on either side of a large sediment drift located on the continental rise of the Pacific margin of the Antarctic Peninsula. The mean current speed is comparable, but the mean direction differs by about 121°. The direction of mean flow follows the bathymetric contour, and the maximum speed never exceeds 20 cm/s. The potential temperature is remarkably stable. The cross-covariance indicates a significant peak at 20.2 days lag. The observed bottom water flow is consistent with deposition of Holocene hemipelagic sediments of the 'drift maintenance' stage. Indicators for palaeoceanographic conditions during glacial periods of the 'drift maintenance' stage and older 'drift growth' stage are at present too scarce to understand fully how the past oceanographic conditions influenced the evolution of the drifts. (Auth. mod.)

## See also:

A-56505 A-56506 A-56559 B-56366 B-56459 B-56497 B-56501  
 B-56511 B-56530 B-56540 B-56551 B-56561 B-56577 B-56579  
 B-56580 B-56615 B-56616 B-56617 B-56682 B-56709 B-56743  
 B-56787 B-56789 B-56790 B-56894 B-56933 B-56934 B-56935  
 B-56970 B-56972 B-56973 B-57004 B-57036 B-57037 B-57039  
 B-57040 B-57088 B-57099 B-57105 B-57111 B-57115 B-57119  
 B-57130 B-57169 B-57189 B-57190 B-57192 B-57194 B-57195  
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 B-57342 B-57424 B-57456 B-57549 B-57584 B-57585 B-57588  
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 B-57722 B-57752 B-57757 B-57789 B-57820 B-57821 B-57863  
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 L-57269 L-58080



## K. ATMOSPHERIC PHYSICS

### K-56345

Suzuki, H., **Broad-spatial characteristics and energy spectrum characteristics of auroral X-rays observed by a Polar Patrol Balloon**, *Antarctic record*, July 1996, 40(2), p.125-155, In Japanese with English summary. Refs. p.154-155.

Polar Patrol Balloon (PPB) No.6 experiment was performed in order to observe wide-area characteristics of bremsstrahlung X-rays radiated from energetic precipitated electrons. PPB No.6 was launched from Showa Station on Jan. 5, 1993 and flew along one and a half circumpolar paths. Distinct enhancements of auroral X-rays were often observed during the entire flight period of 27 days. This is the first observation of broad-spatial distribution of auroral X-rays by a unique instrument onboard a long life balloon. X-ray enhancements were dominant in the magnetic local dayside, and some small enhancements were observed at low latitude below 60°. Such low latitude enhancements have simple temporal structures similar to plasmaspheric hiss. Latitudinal dependence of auroral X-ray spectrum agrees with latitudinal dependence of characteristic energy for cyclotron resonance. Diurnal energy variation of the X-ray spectrum was observed. This variation can be explained by theoretical precipitation lifetime on cyclotron resonance. All of the observed facts suggest that energetic electron precipitation is caused by cyclotron resonance. (Auth. mod.)

### K-56402

Baker, D.N., ed, Papitashvili, V.O., ed, Teague, M.J., ed, STEP Symposium/5th COSPAR Colloquium, Laurel, MD, Aug. 24-28, 1992, **Solar-Terrestrial Energy Program: the initial results from STEP facilities and theory campaigns. Proceedings**, *COSPAR Colloquia Series*, 1994, Vol.5, 828p., Refs. passim. For selected papers see K-56403 through K-56410.

#### DLC QC811.S7 1992

This volume contains the articles presented at the Solar-Terrestrial Energy Program (STEP) Symposium held in Laurel, MD, on Aug. 24-28, 1992 in conjunction with the International Space Year COSPAR Conference. Nearly 300 papers were presented, summarizing major achievements in the study of geospace and in the establishment of new research facilities; 150 of them are presented in this volume, 8 are pertinent to Antarctica. The papers are divided into 8 sections according to subject matter.

### K-56403

Ono, T., **Energy parameters of auroral electrons derived by using the intensity ratios of auroral emissions**, *COSPAR Colloquia Series*, 1994, Vol.5, STEP Symposium/5th COSPAR Colloquium, Laurel, MD, Aug. 24-28, 1992. Solar-Terrestrial Energy Program: the initial results from STEP facilities and theory campaigns. Proceedings. Edited by D.N. Baker, V.O. Papitashvili and M.J. Teague, p.187-195, 18 refs.

#### DLC QC811.S7 1992

Energy parameters of the auroral electrons such as an average energy and a total energy flux are estimated by using the intensity ratios of auroral emissions measured with a multi-channel photometer which has a narrow field of view (FOV; 1 degree) directed to the magnetic zenith of the observation point. The observation was carried out at Showa Station in 1990. Measured intensity ratios are directly compared with the results of the model calculation of auroral emissions by using the two-stream method. Average energy and total energy flux of the auroral electrons determined by the present method gave a good consistency with the previous photometric methods of ground based observation within the limited conditions of auroral activity they required. Data analyses for the active auroras in break-up phase showed that the usage of the 670.5 nm intensity gave a good consistency in the results of the estimation. Results showed a rapid change of the average energy of the auroral electrons associated with the active auroral arcs. (Auth. mod.)

### K-56404

Olson, J.V., Fraser, B.J., **Conjugate ULF pulsations in the cusp**, *COSPAR Colloquia Series*, 1994, Vol.5, STEP Symposium/5th COSPAR Colloquium, Laurel, MD, Aug. 24-28, 1992. Solar-Terrestrial Energy Program: the initial results from STEP facilities and theory campaigns. Proceedings. Edited by D.N. Baker, V.O. Papitashvili and M.J. Teague, p.205-212, 22 refs.

#### DLC QC811.S7 1992

A joint study of ULF pulsation data taken at the conjugate cusp sites of Longyearbyen, Svalbard, Norway and Davis, Antarctica has shown that there is similarity in the observed spectra. In the lowest frequency Pc5 band, coherent pulsations are found which show similar right-hand polarization at both sites. The authors believe these signals represent the oscillation of closed field lines near the magnetopause with their footprint in, or near, the footprint of the cusp in the ionosphere. In the Pc3 band, correlations are found for the coherent waves in the cusp but not for the more incoherent portion of the Pc3 spectrum resident in the boundary layers. The coherent portion may represent signals generated by sources upstream of the magnetopause while the incoherent signals are probably generated by fluctuations in the precipitating particles in the boundary layers. (Auth.)

### K-56405

Menk, F.W., et al, **ULF wave sources at polar cusp and boundary layer latitudes**, *COSPAR Colloquia Series*, 1994, Vol.5, STEP Symposium/5th COSPAR Colloquium, Laurel, MD, Aug. 24-28, 1992. Solar-Terrestrial Energy Program: the initial results from STEP facilities and theory campaigns. Proceedings. Edited by D.N. Baker, V.O. Papitashvili and M.J. Teague, p.301-304, 14 refs.

#### DLC QC811.S7 1992

An array of 6 Australian antarctic ground magnetometer stations spanning sub-auroral oval to polar cap latitudes has been used to investigate the source regions of ULF waves with frequency between 1 mHz and 3 Hz. Ground riometer, ionosonde and DMSP spacecraft particle data were used to identify the corresponding magnetospheric regions. Regular daytime pulsation activity was sorted into Pc1-2 (0.1-3 Hz), Pc3-4 (10-100 mHz) and long period ( $f < 10$  mHz) regimes within which different spectral characteristics occurred in different regions. For instance, the midday cusp was found to be characterized by unstructured Pc1-2 ( $f < 0.45$  Hz) noise and long period ( $1 < f < 10$  mHz) irregular pulsations. While the former correlate with the low altitude particle signature of the cusp, the latter emissions do not. This paper reviews the results of this study and identifies possible wave generation mechanisms. (Auth.)

### K-56406

Raspopov, O.M., et al, **Ozone depletion observed by rocket measurements and ground-based observations during the large solar proton events**, *COSPAR Colloquia Series*, 1994, Vol.5, STEP Symposium/5th COSPAR Colloquium, Laurel, MD, Aug. 24-28, 1992. Solar-Terrestrial Energy Program: the initial results from STEP facilities and theory campaigns. Proceedings. Edited by D.N. Baker, V.O. Papitashvili and M.J. Teague, p.497-500, 3 refs.

#### DLC QC811.S7 1992

During significant solar proton events (SPE), which occurred in Oct. of 1989 and were accompanied by pronounced magnetic storms, instruments on rockets launched from a Soviet research vessel in the southern portion of the Indian Ocean, in the auroral zone, recorded a marked reduction of ozone and a great increase of nitric oxide in the middle atmosphere. The ozone depletion and the NO density increase were observed at an altitude of about 45-55 km. It is concluded that results suggest a strong influence of nitric cycle reactions on the ozone depletion in the middle atmosphere during SPE.



**K-56407**

Stoker, P.H., Van Wyk, J.P., **Ionosphere D-layer ionization at Sanae, Antarctica, during solar flare events in particular of September/October 1989**, *COSPAR Colloquia Series*, 1994, Vol.5, STEP Symposium/5th COSPAR Colloquium, Laurel, MD, Aug. 24-28, 1992. Solar-Terrestrial Energy Program: the initial results from STEP facilities and theory campaigns. Proceedings. Edited by D.N. Baker, V.O. Papitashvili and M.J. Teague, p.501-504, 5 refs.

**DLC QC811.S7 1992**

At a cutoff rigidity of 0.86 GV at SANAE, the residual integral flux of a large ground level solar proton event is insufficient to ionize the atmosphere to such an extent that a riometer absorption will be recorded. During the large ground level enhancements (GLE's) of Sep. 29, and Oct. 19 and 24, 1989, linear increases in the absorptions of 20, 30 and 51.4 MHz cosmic radio noise have been recorded, ranging for 30 MHz from 0.25 dB per hour for a GLE of 26% per hour to 0.81 dB per hour for a GLE of 360% per hour. Lowering of cutoff rigidity by magnetospheric ring current or precipitation of energetic electrons due to magnetic activity may be ruled out. It is concluded that solar protons, not relativistic solar electrons, transversed the geomagnetic field lines by equatorward gradient and curvature drift from the polar cap region and westward longitudinal drift along  $L=4.0$  to be precipitated into the atmosphere at SANAE due to the South Atlantic Magnetic Anomaly. (Auth. mod.)

**K-56408**

Papitashvili, V.O., Teague, M.J., Friis-Christensen, E., Allen, J.H., **One-minute geomagnetic data base for STEP: Project 6.4**, *COSPAR Colloquia Series*, 1994, Vol.5, STEP Symposium/5th COSPAR Colloquium, Laurel, MD, Aug. 24-28, 1992. Solar-Terrestrial Energy Program: the initial results from STEP facilities and theory campaigns. Proceedings. Edited by D.N. Baker, V.O. Papitashvili and M.J. Teague, p.613-622, 11 refs.

**DLC QC811.S7 1992**

Global coverage of the ground-level magnetic field is required to support many STEP projects and campaigns. The objective of STEP Project 6.4 (Ground-Based Magnetometer Data Center) is to establish an on-line, global coverage, ground-based, one-minute magnetometer database, and to identify geographical areas that need increased coverage. The contemplated database would contain magnetometer data from 111 sites worldwide. A variety of services will be available including on-line metadata, graphical display, and data transmission using a number of standard data formats. A progress report is given including presentation of the Project 6.4 magnetometer sites. The selected sites are shown in tables and include several antarctic and subantarctic stations. It is intended that the database will be established at NOAA/NGDC.

**K-56409**

Papitashvili, N.E., **Data bases and knowledge tools in geomagnetism**, *COSPAR Colloquia Series*, 1994, Vol.5, STEP Symposium/5th COSPAR Colloquium, Laurel, MD, Aug. 24-28, 1992. Solar-Terrestrial Energy Program: the initial results from STEP facilities and theory campaigns. Proceedings. Edited by D.N. Baker, V.O. Papitashvili and M.J. Teague, p.653-662, 4 refs.

**DLC QC811.S7 1992**

The worldwide magnetic observatory network is listed and structured by the key geomagnetic regions and indices and includes several antarctic and subantarctic stations. The average cell of the network ( $\approx 2000 \times 2000$  km) is based on the sizes of the large-scale ionospheric and magnetospheric current systems and the requirements of the secular variation models. Storage of the "table" data and digital records on modern media (e.g. CD-ROM) is discussed. A modular concept of the "Personal Information Center" (PIC) is suggested for use with the knowledge tools; it would permit a scientist to analyze the gigabyte-size geomagnetic databases on a personal computer. Application of modern algorithms and models with the PIC concept will help to develop a number of Expert Systems in geomagnetism. (Auth.)

**K-56410**

Papitashvili, V.O., Troshichev, O.A., **Capabilities of Russian geophysical networks in the Arctic and Antarctic and their**

**value to STEP Projects**, *COSPAR Colloquia Series*, 1994, Vol.5, STEP Symposium/5th COSPAR Colloquium, Laurel, MD, Aug. 24-28, 1992. Solar-Terrestrial Energy Program: the initial results from STEP facilities and theory campaigns. Proceedings. Edited by D.N. Baker, V.O. Papitashvili and M.J. Teague, p.675-679, 5 refs.

**DLC QC811.S7 1992**

The present status of geophysical networks at high arctic and antarctic latitudes is reported. Capabilities of existing chains of instruments and planned experiments are analyzed for potential contribution to STEP Projects. The Russian Arctic Region covers about 8 MLT hours; magnetic data from these sites are very important for the calculation of AE-index. A global conjugate array of automatic stations could be deployed in Greenland and Antarctica to study the high-latitude geophysical phenomena and their apparent conjugacy. (Auth.)

**K-56534**

Singh, J., **First Indian solar astronomical program at Antarctica: study of large convective cells**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.21-28, 10 refs.

To study the evolution and decay of large convective cells known as supergranules, a solar telescope was set up at the Maitri Station during Dec. 1989 through Mar. 1990. The need for astronomical observations from Antarctica, the experimental set up to obtain the filtergrams of the sun through K-line (1.2 Å pass band) filter, and the observing conditions at Maitri Station are described. Calcium K-line filtergrams at about 10 minute intervals were obtained whenever clear weather permitted. The analysis of a continuous sequence of filtergrams obtained for 106 hours indicates that the most probable lifetime of the calcium K network is about 22 hours. The lifetime depends upon the size of the cell and is longer for bigger cells. The data also show that cells (of a given size) associated with remanent magnetic field regions live longer than those in the field free region. It is suggested that the magnetic field may play an important role in the confinement of these structures. (Auth. mod.)

**K-56535**

Uddin, W., Singh, J., **Analysis of an umbral flare observed from Antarctica**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.29-34, 20 refs.

Observations in Call K of an umbral solar flare of optical importance class SF (subflare), which occurred on Feb. 12, 1990 are reported. These observations have been correlated with the ones taken in H-alpha and in the radio region reported in Solar Geophysical Data (SGD). Though the umbral flare was small, it showed the impulsion behavior in the microwave region. It is concluded that this was a special and very rare class of an umbral flare which is more energetic in microwave and radiowave regions than in the optical region. (Auth.)

**K-56571**

Anderson, B.J., Erlandson, R.E., Engebretson, M.J., Alford, J., Arnoldy, R.L., **Source region of 0.2 to 1.0 Hz geomagnetic pulsation bursts**, *Geophysical research letters*, Apr. 1, 1996, 23(7), p.769-772, 17 refs.

Geomagnetic pulsations from 0.2 to 5.0 Hz (Pc 1) observed on the ground could be used to monitor the magnetospheric processes generating them if their source regions were known. Simultaneous observations of Pc 1 bursts at South Pole Station and in space at 9  $R_E$  geocentric distance near the magnetic equator show that the subsolar outer magnetosphere, earthward of the low latitude boundary layer, is the source region of Pc 1 bursts. The source extends 1 to 2 hours azimuthally and 1 to 2  $R_E$  radially. Correlation of magnetopause displacements and bursts at South Pole indicates that the bursts are stimulated by compressions of the dayside magnetosphere. In space the bursts occur above the  $He^+$  gyrofrequency implying that the  $H^+-He^+$  bi-ion resonance does not prevent the signals from reaching the ionosphere. (Auth.)

**K-56620**

Venkatachari, R., Saha, A.K., Nakra, D.R., Srivastava, B.J., **Some**



**interesting features of the infrasonic observation carried out during the Fifth Indian Antarctic Expedition (1985-86)**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.363-366, 2 refs.

**DLC G850.I53 I53**

Microbarograph observations in Antarctica, in conjunction with the other observations there as well as in India, are reported. One significant feature noted during the expedition in a sunspot minimum year, as compared to the 2nd Indian expedition when the sunspot activity was higher, is that the generation of infrasonic waves in the substorm, and their propagation to the lower latitude, were inhibited. (Auth.)

**K-56621**

Rangarajan, G.K., Dhar, A., **Some features of Pc5 magnetic pulsations in Dakshin Gangotri, Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.367-381, 20 refs.

**DLC G850.I53 I53**

Magnetic pulsation data in the Pc5 range (150-600 sec periodicity) in Feb. 1986, at Dakshin Gangotri Station were analyzed through power spectral methods, 3-dimensional polarization, complex demodulation and single station transfer function for the induction vectors. Dynamic spectra showed that the oscillations were confined to basically 3 bands of frequencies. The anticipated change in ellipticity and polarization (left handed to right handed) across the magnetic local noon was not observed, suggesting that plasmopause location may be further west of the station. For all the 3 frequency bands the orientation of the major axis of the ellipticity of polarization was quite stable as a function of time. The induction arrows computed for 350, 200 and 150 sec and periodicity point to inland contrary to the expected direction towards the deep oceans, suggestive of some conductive structure in the antarctic landmass close to the magnetic station. (Auth.)

**K-56735**

Nishiizumi, K., Caffee, M.W., Jull, A.J.T., Reedy, R.C., **Exposure history of lunar meteorites Queen Alexandra Range 93069 and 94269**, *Meteoritics & planetary science*, Nov. 1996, 31(6), p.893-896, 27 refs.

Cosmic-ray produced  $^{14}\text{C}$ ,  $^{36}\text{Cl}$ ,  $^{26}\text{Al}$ , and  $^{10}\text{Be}$  in the recently discovered lunar meteorites Queen Alexandra Range 93069 (QUE 93069) and 94269 (QUE 94269) were measured by accelerator mass spectrometry. The abundance pattern of these four cosmogenic radionuclides and of noble gases indicates QUE 93069 and QUE 94269 were a paired fall and were exposed to cosmic rays near the surface of the Moon for at least several hundred million years before ejection. After the meteorite was launched from the Moon, where it had resided at a depth of 65-80 g/cm<sup>2</sup>, it experienced a short transition time, ca. 20-50 ka, before colliding with the Earth. The terrestrial age of the meteorite is 5-10 ka. Comparison of the cosmogenic nuclide concentrations in QUE 93069/94269 and MAC 88104/88105 clearly shows that these meteorites were not ejected by a common event from the Moon. (Auth.)

**K-56752**

Wang, Z., Rosenberg, T.J., Stauning, P., Basu, S., Crowley, G., **Calculations of riometer absorption associated with F region plasma structures based on Sondre Stromfjord incoherent scatter radar observations**, *Radio science*, Jan.-Feb. 1994, 29(1), p.209-215, 19 refs.

**DLC QC851.R3 1994**

On several occasions significant riometer absorption has been measured at the Amundsen-Scott Station in association with F region plasma patches formed in the cusp and propagating into the polar cap. However, detailed information about the F region structures such as plasma densities and temperatures, which is required to quantitatively study the response of riometer absorption, is unavailable from the instrumentation in Antarctica. Because both incoherent scatter radar and imaging riometer data are available from Sondre Stromfjord, it is possible to study such phenomena from that location. The authors have analyzed an event that occurred on Sep. 14, 1991, when the radar and local ionosonde observed an F region plasma

patch moving poleward on the dayside. Calculated values of the zenithal riometer absorption, arising from electron-ion collisions in the F region, were of the same order as the measured absorption when the patch was overhead. After the patch had passed, however, the measured zenithal absorption significantly exceeded the calculated contribution from the F region. The authors attribute this to the later presence of absorption in lower altitude regions of the ionosphere, which is confirmed by the ionosonde measurements of increased  $f_{\text{min}}$ . (Auth. mod.)

**K-56753**

Whalen, J.A., **Properties of the F layer plasma in the midday throat ridge and trough**, *Radio science*, Jan.-Feb. 1994, 29(1), p.219-230, 11 refs.

**DLC QC851.R3 1994**

The tongue or ridge of the F layer plasma in the region of the dayside throat of the convection pattern is studied in order to determine its source and its relation to the daytime trough. A global array of 6 ionospheric sounders near 75° MLAT situated in both hemispheres provide the observations spanning 19 consecutive months at solar maximum. The seasonal dependence of the ridge is found to be consistent with solar production at all the stations, implying that the plasma in the ridge at this latitude results from ionization by solar radiation, not by particles precipitated through the cusp/cleft. The local time dependence at Little America and at the Amundsen-Scott Station implies that the plasma is not produced at the observation site but is transported by convection from the dayside. (Auth. mod.)

**K-56827**

Bianchi, C., Cerrone, M., Ciruolo, L., De Franceschi, G., Spalla, P., Zolesi, B., **Ionospheric observatory at Terra Nova Bay: present and future activities**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.369-375, 10 refs.

Ionospheric observations in polar zones play an important role in aeronomomic studies, being suitable tools to test continuously the state of the upper atmosphere in relation to solar and geomagnetic activities. In the frame of the Italian Program of Researches in Antarctica, an ionospheric observatory is now operating at Terra Nova Bay Station. An overview of the current and future observational and research activities is presented, together with a short description of the equipment used. (Auth.)

**K-56828**

Perrone, L., De Franceschi, G., De Santis, A., **Ionospheric absorption measurements at the Italian base station of Terra Nova Bay, Antarctica**, Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.51, Bologna, Italian Physical Society, 1996, p.377-383, 15 refs.

Ionospheric absorption measurements, obtained at the Terra Nova Bay Station by cosmic noise monitoring with the Relative Ionospheric Opacity Meter method, are discussed. A description of the scientific equipment used is given, together with the numerical technique applied to analyze the riometer data series and to define the Quiet Day Curve (QDC) (expressed in sidereal time), which is necessary for determining the absorption values. (Auth. mod.)

**K-56851**

Bottollier-Depois, J.F., **Cosmic ray dosimetry using NAUSI-CAA** [Dosimétrie du rayonnement cosmique à l'aide de NAUSI-CAA], *CLEFS CEA*, Summer 1996, No.32, p.48-60, In French.

Highlights of a Franco-Russian program, which includes the collaboration of the Nuclear Protection and Safety Institute, designed to evaluate the cosmic radiation received by astronauts are presented. An expedition to Mt. Erebus, an active volcano on Ross I. where measurements of cosmic rays were made, and the equipment used to collect the data, are described.

**K-56922**

Ogawa, T., **Radar observations of ionospheric irregularities at Syowa Station, Antarctica: a brief overview**, *Annales geophysicae*, Dec. 1996, 14(12), p.1454-1461, Refs. p.1460-1461.



The author briefly overviews radar observations made for 30 years at Showa Station for studying small-scale electron-density irregularities in the southern high-latitude E- and F-region ionosphere. Some observational results (i.e., long-term variations of radio aurora, Doppler spectra with narrow spectral widths and low Doppler velocities, and simultaneous observations of radar and optical auroras) from VHF radars capable of detecting 1.3- to 3-m scale irregularities are presented. A new 50-MHz radar system equipped with phased-antenna arrays began operation in Feb. 1995 to observe two-dimensional behaviors of E-region irregularities. An HF radar experiment also began in Feb. 1995 to explore decameter-scale E- and F-region irregularities in the auroral zone and polar cap. It is suggested that these two radars will contribute to a better understanding of the ionospheric irregularities and ionospheric physics at southern high latitudes. (Auth.)

#### K-56954

Liu, C.F., Zhang, P., Yang, Y.H., Liu, C.J., Wang, Y., **Geomagnetic disturbed daily variation  $S_D$  field in Antarctica**, *Antarctic Research (Chinese edition)*, Sep. 1996, 8(3), p.54-60, In Chinese with English summary. 7 refs.

Antarctic geomagnetic data were used to study the daily variation ( $S_D$ ) of geomagnetic field disturbances. Unlike the  $S_q$ -field,  $S_D$ -field variation is irregular and doesn't differ between daytime and nighttime. The  $S_D$  variation was more intense in the solar maximum year (1991) than in the decreasing phase of the solar cycle (1994). The amplitude of the  $S_D$ -field at Zhongshan Station in the polar cusp is ten times larger than at the Great Wall Station; sub-auroral region. The  $S_D$ -field consists of the periodical disturbed daily variation ( $S_D^0$ ) and superposed irregular intense disturbance ( $S_D^d$ ). The morphology of  $S_D^0(H)$  is a "Sin" pattern at Zhongshan Station, which is opposed to that at the Great Wall Station. The equivalent current vectors of  $S_D^0$ -variation at Zhongshan Station run clockwise, westward, in the morning and counter-clockwise, eastward, in the afternoon and night. (Auth. mod.)

#### K-56963

Shen, C.S., Zi, M.Y., Schlegel, K., **Two types of ionospheric disturbance in the auroral region**, *Antarctic Research (Chinese edition)*, Dec. 1996, 8(4), p.11-19, In Chinese with English summary. 9 refs.

The EISCAT data are used to confirm the important role of precipitation particles in the ionization rate in the auroral region. The height range of the effective ionization is quite different for particles with different energies. An enhancement of magnetospheric convection often results in decreasing of electron density,  $N$ , in the F-layer. During Jan. 28-29, 1985, the disturbed profile of  $N$  was very typical, in which  $N(\text{E-layer}) \gg N(\text{F-layer})$  and  $N$  decreased with height above 147 km. This phenomenon was caused by both energetic particles and intensive convection. During the period of Feb. 16-17, 1993, however, the  $N(\text{F-layer})$  increased extremely, while  $N(\text{E-layer})$  remained low. This is also a typical profile. In this case, the particles with lower energy ( $<1\text{keV}$ ) in the magnetosheath enter directly the high latitude ionosphere through the cusp, and can contribute significantly to the F-layer ionization content. (Auth.)

#### K-57234

Smith, A.J., Freeman, M.P., Reeves, G.D., **Postmidnight VLF chorus events, a substorm signature observed at the ground near  $L=4$** , *Journal of geophysical research*, Nov. 1, 1996, 101(A11), p.24,641-24,653, 28 refs.

The VLF/ELF Logger Experiment (VELOX) instrument, located at Halley Station ( $L=4.3$ ) is particularly well suited to a systematic study of the chorus aspect of the substorm phenomenon. The data exist almost continuously from January 1992 onward, at 1-s time resolution in eight quasi-logarithmically spaced frequency bands covering the range 0.25-10 kHz. For this paper, 327 days of continuous data have been analyzed. 243 substorm related chorus events (SCEs) were observed on about 50% of days, mostly in the 2300-0600 time range, for a limited duration and showed an upward frequency drift. Additional details of these and further pertinent observations are identified and explained. (Auth. mod.)

#### K-57236

Lu, G., et al, **High-latitude ionospheric electrodynamics as determined by the assimilative mapping of ionospheric elec-**

**trodynamic procedure for the conjunctive SUNDIAL/ATLAS 1/GEM period of March 28-29, 1992**, *Journal of geophysical research*, Dec. 1, 1996, 101(A12), p.26,697-26,718, 52 refs.

In this study the AE index is calculated from ground magnetic perturbations observed by 63 stations located between  $55^\circ$  and  $76^\circ$  magnetic latitudes north and south, which is larger than the standard AE index by about 20% on the average over these 2 days. Different energy dissipation channels have also been estimated. On the average over the 2 days, the total globally integrated Joule heating rate is about 102 GW and the total globally integrated auroral energy precipitation rate is about 52 GW. Using an empirical formula, the ring current energy injection rate is estimated to be 125 GW for a decay time of 3.5 hours, and 85 GW for a decay time of 20 hours. An energy-coupled efficiency of 3% is derived between the solar wind and the magnetosphere for a southward interplanetary magnetic field (IMF) condition. (Auth. mod.)

#### K-57237

Lyons, L.R., Lu, G., de la Beaujardière, O., Rich, F.J., **Synoptic maps of polar caps for stable interplanetary magnetic field intervals during January 1992 geospace environment modeling campaign**, *Journal of geophysical research*, Dec. 1, 1996, 101(A12), p.27,283-27,298, 47 refs.

Observations from Jan. 27-28, 1992, when four polar-orbiting DMSP satellites were in operation, are used to construct synoptic maps of convective flows and particle regions within the polar ionosphere. Periods were chosen of relative steady interplanetary magnetic field (IMF) and data are used from multiple satellite passes during each period to obtain unprecedented two-dimensional coverage. For strongly negative IMF  $B_y$ , convection patterns are similar to those that have been previously obtained but also show significant IMF  $B_z$  effects. For  $B_z \gg B_y$ , the authors see strong sunward flow near the pole, but antisunward convection on open field lines at lower latitudes on the nightside. Dawn-dusk displacements of the open field line regions in the two polar caps are seen that are consistent with IMF  $B_y$  effects. Additionally, the dayside separatrix is observed to be further poleward for positive than for negative IMF  $B_z$ , whereas  $B_z$  is not observed to have a significant effect on the location of the nightside separatrix. Also, consistently there are found larger cross polar-cap potential drops in the Southern Hemisphere than in the Northern Hemisphere. This suggests that there are significant (tens of kV) magnetic-field-aligned potential drops along high-altitude regions of open field lines where the magnetic field is weak and particle motion strongly violates the guiding center approximation. (Auth. mod.)

#### K-57248

Wells, G.D., Rodger, A.S., Moffett, R.J., Bailey, G.J., Fuller-Rowell, T.J., **Effects of nitric oxide cooling and the photodissociation of molecular oxygen on the thermosphere/ionosphere system over the Argentine Islands**, *Annales geophysicae*, Mar. 1997, 15(3), p.355-365, 22 refs.

In the past the global, fully coupled, time-dependent mathematical model of the Earth's thermosphere/ionosphere/plasmasphere (CTIP) has been unable to reproduce accurately observed values of the maximum plasma frequency, foF2, at extreme geophysical locations such as the Argentine Is. during the summer solstice where the ionosphere remains in sunlight throughout the day. This occurs because the seasonal dependence of thermospheric cooling by  $5.3 \mu\text{m}$  nitric oxide has been neglected and the photodissociation of  $\text{O}_2$  and heating rate calculations have been oversimplified. Now the authors have included an up-to-date calculation of the solar EUV and UV thermospheric heating rate, coupled with a new calculation of a diurnally varying  $\text{O}_2$  photodissociation rate, in the model. Seasonally dependent  $5.3 \mu\text{m}$  nitric oxide cooling is also included. With these improvements, it is found that model values of foF2 are in substantially better agreement with observation. The height of the F2 peak is reduced throughout the day, but remains within acceptable limits of values derived from observation, except at around 0600 h LT. (Auth. mod.)

#### K-57252

Chamberlin, R.A., Lane, A.P., Stark, A.A., **492 GHz atmospheric opacity at the geographic South Pole**, *Astrophysical journal*, Feb. 10, 1997, 476(1), p.428-433, 15 refs.



The authors present narrow-bandwidth submillimeter-wave sky opacity measurements made at the Amundsen-Scott Station between Feb. 9-17, 1995. These measurements were made with the Antarctic Submillimeter Telescope and Remote Observatory (AST/RO) using a heterodyne receiver tuned to a band that includes the 492 GHz fine-structure line of neutral atomic carbon. The zenith optical depth was below 0.72 half the time during winter and spring, and it reached values as low as 0.34 on day 232; opacity remained below 1.0 for weeks at a time. The functional relationship between 492 GHz opacity and measured precipitable water vapor shows that a significant fraction of the opacity is caused by atmospheric constituents other than water vapor, indicating the need for accurate, site-dependent atmospheric modeling when opacity measurements at lower frequencies are extrapolated into the submillimeter. (Auth. mod.)

#### K-57276

Takahashi, Y., et al, **Search for cosmic strangelets with the supersonic concorde and with JACEE's circumpolar balloon flight in Antarctica**, *Hyperfine interactions*, Dec. 1996, 103(1-4), p.99-111, 13 refs.

The search for cosmic strangelet nuclei was carried out by two experiments with emulsion chambers. A balloon-borne JACEE emulsion chamber was flown at 3.5 g/cm<sup>2</sup> for 200 h in Antarctica (JACEE-10 experiment) and the Concorde flights were made by ECHOS at an atmospheric depth of 110 g/cm<sup>2</sup> between Paris and New York. No nuclei with  $Z \geq 30$  survived after traversing 60-120 g/cm<sup>2</sup> of the detector materials in the JACEE instruments. No evidence for a long mean free path were found in the zenith angle distribution for  $Z/\beta \geq 26$  nuclei. The exposure factor used by the JACEE was 72 m<sup>2</sup> h sr. The intensity upperbounds,  $I \leq (2.2-9.7) \times 10^{-2} / \text{m}^2 \text{ h sr}$ , were obtained for strangelets having an atmospheric attenuation length of 220-50 g/cm<sup>2</sup>, which corresponds to the case for mass number  $A=100-10,000$  and  $Z/\beta > 13$ . (Auth. mod.)

#### K-57282

Engebretson, M.J., ed, Takahashi, K., ed, Scholer, M., ed, **Solar wind sources of magnetospheric ultra-low-frequency waves**, *American Geophysical Union. Geophysical monograph*, 1994, No.81, 424p., Refs. passim. For selected papers see K-57283 through K-57286.

#### DLC QC809.M35S645 1994

This volume is the result of an AGU Chapman Conference held Sep. 14-18, 1992, in Williamsburg, VA. The aim of the meeting was to discuss physical processes leading to magnetospheric ULF waves due to the solar wind-geospace interaction, and to determine the current status, aims, and future directions of research in this area. Four of the papers included are pertinent to Antarctica.

#### K-57283

Olson, J.V., Fraser, B.J., **Pc3 pulsations in the cusp**, *American Geophysical Union. Geophysical monograph*, 1994, No.81, Solar wind sources of magnetospheric ultra-low-frequency waves, edited by M.J. Engebretson, K. Takahashi and M. Scholer, p.325-334, Refs. p.333-334.

#### DLC QC809.M35S645 1994

The authors have studied the Pc3 spectrum beneath the boundary layers and the cusp using data from pairs of stations in order to infer the local coherence of the pulsations. The first pair of stations used were Cape Parry and Sachs Harbor in Canada which are separated by approximately 150 km. The second pair are the near conjugate stations of Longyearbyen, Svalbard and Davis Station, Antarctica. Pc3 detected in the boundary layers are characterized by large amplitude and broad-band features and show little or no inter-station coherence. The Pc3 detected in the central cusp tend to be narrow-band packets which show good correlation, even between hemispheres. The lack of coherence between the two northern stations implies a short correlation length for the precipitating beams producing the Pc3 variations in the boundary layers. The correlation of central cusp Pc3 implies coherent illumination of the cusp region which leads to the conclusion that these pulsations have their source upstream of the magnetopause. (Auth. mod.)

#### K-57284

Engebretson, M.J., et al, **Studies of the occurrence of properties of Pc 3-4 magnetic and auroral pulsations at South Pole, Ant-**

**arctica**, *American Geophysical Union. Geophysical monograph*, 1994, No.81, Solar wind sources of magnetospheric ultra-low-frequency waves, edited by M.J. Engebretson, K. Takahashi and M. Scholer, p.345-353, 19 refs.

#### DLC QC809.M35S645 1994

Amundsen-Scott Station is uniquely situated for studies of the high latitude winter ionosphere both because of the extended darkness its geographical location allows and because it is located near the nominal latitude of the foot of the dayside cusp/cleft region during periods of moderate geomagnetic activity. In this study, the authors use data from magnetometers, all-sky imagers, and zenith-viewing photometers at Amundsen-Scott Station to compare optical and magnetic signatures of Pc 3-4 pulsations as a function of the proximity of the dayside auroral oval to the observing station. They find that the optical and magnetic pulsations are closely linked: narrowband Pc 3-4 optical pulsations occur only when similarly narrowband Pc 3-4 magnetic pulsations are also present. Both statistically and on a case-by-case basis, they find that modulations in 427.8 nm auroral light at Pc 3-4 frequencies occur during times when the dayside auroral oval is at least slightly poleward of the observing station. These observations place the location of the optical Pc 3-4 pulsations under either the boundary layer or the outer edge of the magnetosphere, but not under plasma mantle field lines. In addition, they have so far found no evidence of these optical pulsations in the cusp itself. (Auth. mod.)

#### K-57285

Takahashi, K., Anderson, B.J., Newell, P.T., Yamamoto, T., Sato, N., **Propagation of compressional Pc 3 pulsations from space to the ground: a case study using multipoint measurements**, *American Geophysical Union. Geophysical monograph*, 1994, No.81, Solar wind sources of magnetospheric ultra-low-frequency waves, edited by M.J. Engebretson, K. Takahashi and M. Scholer, p.355-363, Refs. p.362-363.

#### DLC QC809.M35S645 1994

In order to understand the signal propagation process, the authors have examined an interval of Pc 3 pulsations observed in the dayside subsolar magnetosphere with the AMPTE CCE satellite and on the ground at 5 stations: 3 in Iceland (L 6), a station conjugate to Iceland in Antarctica, and another station at the average cusp latitude. For the selected interval, 0900-1200 UT of Jan. 27, 1986, the interplanetary magnetic field was monitored by IMP-8. DMSP particle data are also available for estimating the location of the ground stations relative to magnetospheric boundaries. CCE was located near the magnetic equator and near the subsolar magnetopause and observed compressional Pc 3 pulsations with peak-to-peak amplitudes as large as 10 nT. Similar pulsations were observed on the ground at L 6 in the H component of the magnetic field but there was a pronounced amplitude difference between geomagnetically conjugate stations. The H polarization and north/south amplitude difference observed on the ground can be understood in terms of ionospheric screening effects on the magnetospheric MHD waves. (Auth. mod.)

#### K-57286

Erlandson, R.E., Zanetti, L.J., Engebretson, M.J., Arnoldy, R., Böisinger, T., Mursula, K., **Pc 1 waves generated by a magnetospheric compression during the recovery phase of a geomagnetic storm**, *American Geophysical Union. Geophysical monograph*, 1994, No.81, Solar wind sources of magnetospheric ultra-low-frequency waves, edited by M.J. Engebretson, K. Takahashi and M. Scholer, p.399-407, 28 refs.

#### DLC QC809.M35S645 1994

A multipoint ground-satellite observation of a Pc 1 wave event is used to investigate electromagnetic ion cyclotron (EMIC) wave generation during a magnetospheric compression. The event occurred on Sep. 15, 1986, from approximately 0400 to 0900 UT. Viking satellite observations were acquired by the magnetic and electric field experiments from 0622 to 0637 UT near 60° invariant latitude, 1130 magnetic local time, and an altitude of 13,500 km. The ground magnetic field observations were acquired throughout the event using the Finnish ground-station chain (Rovaniemi, Ivalo, Kilpisjärvi) and Sondre Stromfjord, Amundsen-Scott, McMurdo and Siple. The event occurred during the recovery phase of a large geomagnetic storm, where  $D_{st}$  reached -180 nT. There was a transient



increase in  $D_{st}$  during the recovery phase of the storm. The wave event was observed during this transient increase in  $D_{st}$ , which is interpreted as a signature of a magnetospheric compression. (Auth. mod.)

#### K-57310

Sakunov, G.G., Alekseeva, G.A., Anikin, S.P., **Measurement of the spectral transparency of the night-time atmosphere** [Izmerenie spektral'noi prozrachnosti atmosfery v nochnoe vremia], *Rossiiskaia Antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1993, No. 117, p.34-39, In Russian. 2 refs.

Radiation from known stars is useful in evaluating data on the optical properties of atmospheric aerosols. The author presents data from the Mirnyy observatory using the quasi-monochrome extra-atmospheric stream from several stars of different magnitudes. The spectral extinction coefficients for June 26, 1989, and the spectral motion of the extinction coefficient on June 21 when 5 values were obtained in the course of 5 hours, are also given. Values for the extinction coefficients in the spectral regions studied agree well with analogous parameters for sun photometry for the winter stratification of the atmosphere between Aug. and Oct. 1989.

#### K-57340

Reising, S.C., Inan, U.S., Bell, T.F., Lyons, W.A., **Evidence for continuing current in sprite-producing cloud-to-ground lightning**, *Geophysical research letters*, Dec. 1, 1996, 23(24), p.3639-3642, 14 refs.

Radio atmospherics, launched by sprite-producing positive cloud-to-ground lightning flashes and observed at Palmer Station, exhibit large extra low-frequency (ELF) slow tails following the initial very low-frequency (VLF) portion, indicating the presence of continuing currents in the source lightning flashes. One-to-one correlation of sferics with NLDN lightning data in both time and arrival azimuth allows unambiguous identification of lightning flashes originating in the storm of interest. Slow-tail measurements at Palmer can potentially be used to measure continuing currents in lightning flashes over nearly half of the Earth's surface. (Auth. mod.)

#### K-57344

Stoker, P.H., Mathews, M.J., Scourfield, M.W.J., **Cosmic radio noise absorption related to structures in auroral luminosity**, *Journal of geophysical research*, Apr. 1, 1997, 102(A4), p.7439-7447, 18 refs.

Digitized all-sky white light images of auroral optical emissions, recorded by a low-light level TV system at SANAE Station, have been mapped onto the angular sensitivity functions of the inner 4 beams of a 16-element imaging riometer. Cosmic radio waves of 5-10 m wavelengths appeared to be absorbed more strongly in directions through regions adjacent to discrete auroral arcs than through the arc regions themselves. The 2 auroral events before local magnetic midnight reported in this paper started with high luminosity and small ionospheric absorption. The absorption increased as the event developed. Auroral luminosities and structures were changing in all 4 viewing directions during the event on May 10, 1997. The event on June 8, 1992, involved a pulsating arc structure. Changes in absorption appeared to be delayed relative to changes in luminosity that varied from 0 to 60 s in a particular viewing direction. The auroral event after local magnetic midnight on Apr. 14, 1993, differed from the former 2 events in the appearance of pulsating auroral patches and in slower temporal variations. (Auth. mod.)

#### K-57359

Hargreaves, J.K., Browne, S., Ranta, H., Ranta, A., Rosenberg, T.J., Detrick, D.L., **Study of substorm-associated nightside spike events in auroral absorption using imaging riometers at South Pole and Kilpisjärvi**, *Journal of atmospheric and solar-terrestrial physics*, May 1997, 59(8), p.853-872, 14 refs.

The short-duration 'spike' events which are a common feature of substorm-associated auroral radio absorption in the midnight sector are observed both at Kilpisjärvi in the auroral zone and at the much higher latitude of the South Pole. It is found that the spike events are remarkably similar at the two latitudes studied. They are usually elliptical in shape with the major axis generally along rather than across the L shells; median dimensions are 167 km by 74 km at the South Pole, and 190 km by 80 km at Kilpisjärvi. It may be significant that in each case the perturbed region

of the ionosphere maps to an almost circular region at the magnetospheric equatorial plane, and that the total magnetic flux included within the event is similar at each latitude. The velocities of the events are variable in the range of several 100 m/s to 2 or 3 km/s; the direction of motion tends to be poleward at the beginning of a precipitation event, and is often equatorward towards the end. (Auth. mod.)

#### K-57362

Weatherwax, A.T., Rosenberg, T.J., MacLennan, C.G., Doolittle, J.H., **Substorm precipitation in the polar cap and associated Pc 5 modulation**, *Geophysical research letters*, Mar. 1, 1997, 24(5), p.579-582, 14 refs.

This paper reports substorm-related cosmic radio noise absorption events observed deep into the antarctic polar cap, well poleward of the typical nightside auroral oval. Riometer data from U.S. manned and automatic geophysical observatories in Antarctica are presented to track the morphology and progression of auroral absorption features over 5 hours of local time at  $\geq 80^\circ$  magnetic latitude. The azimuthal motions observed, westward pre-midnight, eastward post-midnight, are similar to the dynamics expected for lower latitude substorm-related auroral absorption. ULF modulation of the absorption (and hence of the causative fluxes of precipitating energetic electrons) is often observed. Several mechanisms for producing the particle modulations are examined within the context of these observations. (Auth. mod.)

#### K-57415

Richards, A.A., **AMANDA-I: a cosmic-ray detector at the South Pole**, Berkeley, University of California, 1995, 129p., University Microfilms order No. 96-02720, Ph.D. thesis. Refs. p.127-129.

AMANDA-I is a water Cherenkov muon detector located 800-1000 m below the surface of the South Pole icecap. It consists of 4 vertical strings of detectors spaced 30 m apart; each string consists of 20 photomultiplier tubes (PMTs) at 10 m intervals. AMANDA-I was designed to reconstruct trajectories of neutrinos with energies  $>1$  TeV by measuring the arrival times of Cherenkov photons emitted by neutrino-induced muons at a multiplicity of PMTs. Due to photon scattering off of bubbles in the ice, it cannot reliably reconstruct neutrino-induced muon trajectories. However, experience with AMANDA-I has established the feasibility of a PMT array in deeper polar ice and the ability to reconstruct cosmic-ray muon trajectories to within  $5^\circ$  in zenith angle. AMANDA-I is being used for several cosmic-ray experiments and sets the stage for AMANDA-II, a larger instrument to be deployed in bubble-free ice. (Auth. mod.)

#### K-57500

Altadill, D., Apostolov, E.M., Alberca, L., **Some seasonal hemispheric similarities in  $f_oF2$  quasi-2-day oscillations**, *Journal of geophysical research*, May 1, 1997, 102(A5), p.9737-9739, 19 refs.

The annual variations of the amplitude, period, and probability of existence of  $f_oF2$  quasi-2-day oscillations at mid-latitudes in both Southern and Northern Hemispheres are investigated. The  $f_oF2$  hourly data for the period 1977-1982 for stations Kiev and Wakkanai for the Northern Hemisphere, and Kerguelen and Campbell Island for the Southern Hemisphere, are used for analysis. It is found that there is a strong tendency for hemispheric similarities in the seasonal variations of oscillation amplitude, period, and probability of existence. The seasonal similarities in the annual variations of the oscillation period and the probability of existence show the possible influence of the planetary 2-day wave in the middle neutral atmosphere on the electron density variations in the F region. (Auth. mod.)

#### K-57510

Fatkullin, M.N., Solodovnikov, G.K., **Electron concentration structure in the ionosphere at different levels of magnetic activity** [O melkomasshtabnoi strukture elektronnoi kontsentratsii v ionosfere nad Antarktidoi pri razlichnykh urovniakh magnitnoi aktivnosti], *Kosmicheskie issledovaniia*, Apr. 1996, 34(2), p.217-220, In Russian. 6 refs.

Results of a study of the statistical characteristics of the amplitude and phase fluctuations of signals from radio navigation satellites received during a summer season (Nov. 1988-Dec. 1989) in Antarctica are reported.



Qualitative estimates were obtained from the scintillation index and phase dispersions. The phase fluctuation dispersions and the correlation intervals of amplitude and phase fluctuations are expressed in terms of analytical functions.

#### K-57511

Stark, A.A., Chamberlin, R.A., Ingalls, J.G., Cheng, J.Q., Wright, G., **Optical and mechanical design of the Antarctic Submillimeter Telescope and Remote Observatory**, *Review of scientific instruments*, May 1997, 68(5), p.2200-2213, 18 refs.

Antarctic Submillimeter Telescope and Remote Observatory, a 1.7 m diameter telescope for astronomy and aeronomy studies at wavelengths between 200 and 3000  $\mu\text{m}$ , was installed at the South Pole during the 1994-95 austral summer. The optical design is Gregorian, offset in both azimuth and elevation, with the exit pupil at the chopping tertiary mirror; this arrangement provides for consistent illumination of the primary mirror even when the beam is thrown one degree or more on the sky. Aberrations are minimized by the choice of secondary mirror offset angle. Alignment is accomplished by mechanical means. There is a Coudé focus in a warm, spacious receiver room and also a Nasmyth focus. Both the elevation and azimuth axes are driven by two pinion gears with opposed torques to eliminate backlash. The encoders are unusually robust but have high friction, necessitating a stiff coupling. The azimuth limit switch scheme permits 1.5 rotations, but the switches will operate under extreme conditions with no single point of failure. The instrument is now operational with four heterodyne receivers and three acousto-optical spectrometers. (Auth.)

#### K-57533

Askebjerg, P., et al, **UV and optical light transmission properties in deep ice at the South Pole**, *Geophysical research letters*, June 1, 1997, 24(11), p.1355-1358, 9 refs.

Both absorption and scattering of light at wavelengths 410 to 610 nm were measured in the South Pole ice at depths 0.8 to 1 km with the laser calibration system of the Antarctic Muon And Neutrino Detector Array (AMANDA). At the shortest wavelengths the absorption lengths exceeded 200 m—an order of magnitude longer than has been reported for laboratory ice. The absorption shows a strong wavelength dependence while the scattering length is found to be independent of the wavelength, consistent with the hypothesis of a residual density of air bubbles in the ice. The observed linear decrease of the inverse scattering length with depth is compatible with an earlier measurement by the AMANDA collaboration (at ca. 515 nm). (Auth.)

#### K-57538

Ruhl, J.E., Dragovan, M., Platt, S.R., Kovac, J., Novak, G., **Anisotropy in the microwave sky at 90 GHz: results from Python II**, *Astrophysical journal*, Nov. 1, 1995, 453(1)pt.2, p.L1-L4, 13 refs.

Reported here are additional observations of degree-scale anisotropy at 90 GHz from Amundsen-Scott Station. Observations during the first season with the Python instrument yielded a statistically significant sky signal with an amplitude of  $\Delta T/T \approx 3.5 \times 10^{-5}$  for a Gaussian autocorrelation function model with a coherence angle  $\Theta_c = 1^\circ$ . This letter reports the confirmation of that signal with second year data and on results from an interleaving set of fields. Using the entire data set, mathematical statements are developed for a band power estimate, where  $l_e = 93$  is the effective center of the window function. The stated errors represent a 68% confidence interval in the likelihood added in quadrature with a 20% calibration uncertainty. (Auth. mod.)

#### K-57569

Solomentsev, V.V., Logvin, A.I., Prokhorov, A.V., **Assessment of the influence of radiowaves propagation conditions on the operation of the high-frequency direction finding positioning system in the antarctic conditions**, 1995 SBMO/IEEE MTT-S International Microwave and Optoelectronics Conference. Proceedings, vol. 2, São Caetano do Sul, SP, Brazil, Sociedade Brasileira de Microondas e Optoeletrônica, 1995, p.737-740.

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There are significant difficulties in air traffic control during the radar operation in the Antarctic. The cost of radar installations is high, and a large number of radars is needed for long routes (about 1000 km or more). To solve this problem, the construction of a direction finding positioning system (DFPS) is needed. The results of the processing of the experimental data and zones of the DFPS operation for different radiowave propagation conditions are given. (Auth.)

#### K-57658

Ayukawa, M., Makita, K., **Characteristics of daytime aurora at South Pole Station**, *Antarctic record*, Nov. 1996, 40(3), p.267-305, In Japanese with English summary. Refs. p.301-302.

The characteristics of daytime auroras are examined by using all-sky camera photographs taken at Amundsen-Scott Station. The auroral structure near the noon sector (10-14 MLT) mostly shows coronal forms with ray structure. The luminosity of coronal form auroras is generally weaker than that of the midnight discrete auroras. However, their dynamical motion and their luminosity increase during the geomagnetic disturbed period. Activity of daytime coronal auroras is dependent on the North-South component of Interplanetary Magnetic Field variations. The characteristics of morning sector auroras (06-10 MLT) are quite different from afternoon sector auroras (14-18 MLT). This tendency strongly suggests that there are asymmetrical auroral phenomena between the morning and the afternoon regions. (Auth.)

#### K-57664

Füllekrug, M., Fraser-Smith, A.C., **Further evidence for a global correlation of the Earth-ionosphere cavity resonances**, *Geophysical research letters*, Oct. 1, 1996, 23(20), p.2773-2776, 15 refs.

The Stanford ELF/VLF Radio Noise Survey provides digital time series in the ELF range and VLF analog recordings of one horizontal magnetic field component at different locations around the globe. Three sites, Arrival Heights in Antarctica, Sondrestromfjord in Greenland and Stanford in California, are chosen to investigate the natural magnetic noise in the frequency range of the Earth-ionosphere cavity resonances (6-60 Hz). The resonances are interpreted as pure resonance phenomena and the associated parameters are derived in a robust manner by use of the complex exponential algorithm. The resulting amplitudes of the first and second resonances exhibit a pronounced diurnal variation and a distinct day to day variability of the same order during the time interval from Jan. to Apr. 1990. The day to day variability is well correlated between all of the three different sites. They also exhibit a 20-30 day variation that is related to the solar rotation period, expressed by means of sunspot numbers. (Auth.)

#### K-57687

Vorob'ev, V.G., Zverev, V.L., Feldstein, I.A.I., **Polar cap aurora: morphological features and the relation to theta aurora**, *Geomagnetism and aeronomy*, Oct. 1995 (Pub. Apr. 1996), 35(5), p.624-631, Translated from *Geomagnetizm i aeronomiia*. 22 refs.

Using all-sky camera films at the Vostok Station observatory, morphological features of polar cap aurora are investigated. Particular attention is drawn to the Aug. 3, 1986, aurora that persisted for an unusually long 5-hour interval. The Sun-aligned discrete auroral forms are shown to be found inside the transpolar strip of the theta aurora observed from satellites in the UV spectral region. The transpolar strip contained one or more visually discrete forms. Abrupt 15- to 30-min polar cap auroral activities were observed, during which the auroral brightness increased 5-10 times. Active aurora was observed during both northward and southward interplanetary magnetic field. The transpolar strip of the theta aurora was found in the dawn sector at the boundary of the regions of oppositely directed convection. (Auth. mod.)

#### K-57688

Kleimenova, N.G., Kozyreva, O.V., Bitterli, Z., **Long-period geomagnetic pulsations in the theta aurora region on May 11, 1983**, *Geomagnetism and aeronomy*, Oct. 1995 (Pub. Apr. 1996), 35(5), p.632-635, Translated from *Geomagnetizm i aeronomiia*. 8 refs.

The authors analyze numerical recordings of geomagnetic pulsations at the Dumont d'Urville Station when a theta aurora was being viewed from the DE 1 satellite. It is found that under the transpolar auroral arc



projection it is possible to stimulate bursts of long-period (approximately 5-10 min) geomagnetic pulsations in the azimuthal field component. It is shown that the development of the theta aurora occurs during increased solar wind speed and density and high northward interplanetary magnetic field magnitudes. (Auth.)

#### K-57746

Carpenter, D.L., et al, **Quasiperiodic ca. 5-60 s fluctuations of VLF signals propagating in the Earth-ionosphere waveguide: A result of pulsating auroral particle precipitation?**, *Journal of geophysical research*, Jan. 1, 1997, 102(A1), p.347-361, Refs. p.360-361.

Episodes of zigzag activity at Siple Station (L ca. 4.3), and Saskatoon, Canada (L ca. 4.2), were found to occur widely during the predawn hours and were not observed during geomagnetically quiet periods. The fluctuations appeared to be caused by ionospheric perturbations at the ca. 85 km nighttime VLF reflection height in regions poleward of the plasmapause. The authors infer that in the case of the Saskatoon and Siple data, the perturbations were centered with ca. 500 km of the stations and within ca. 100-200 km of the affected signal paths. Their horizontal extent is inferred to have been in the range ca. 50-200 km. The assembled evidence, supported by Corcuff's (1996) recent research at Kerguelen (L ca. 3.7), suggests that the underlying cause of the effect was pulsating auroral precipitation. (Auth. mod.)

#### K-57772

Villante, U., Lepidi, S., Francia, P., Meloni, A., Palangio, P., **Long period geomagnetic field fluctuations at Terra Nova Bay (Antarctica)**, *Geophysical research letters*, June 15, 1997, 24(12), p.1443-1446, 24 refs.

A statistical analysis of the power spectra of the geomagnetic field components H and D recorded at Terra Nova Bay during three austral summers close to the maximum of solar activity reveals power enhancements in the H component at  $\approx 3.3$ , 3.9 and 4.5 mHz, which become more evident during daytime intervals. The observed frequencies are close to the ones detected both at auroral and low latitudes. (Auth. mod.)

#### K-57778

Chamberlin, R.A., Lane, A.P., Stark, A.A., **492 GHz atmospheric opacity at the geographic South Pole**, *Astronomical journal*, Feb. 10, 1997, 476(1, Part 1), p.428-433, 15 refs.

The authors present narrow-bandwidth submillimeter-wave sky opacity measurements made from the South Pole between 1995 Feb. 9 and Nov. 17, a period that includes an entire austral winter. These measurements were made with the Antarctic Submillimeter Telescope and Remote Observatory (AST/RO) using a heterodyne receiver tuned to a band that includes the 492 GHz fine-structure line of neutral atomic carbon. The zenith optical depth was below 0.72 half the time during the austral winter and spring, and it reached values as low as 0.34 on day 232. The stability was also remarkably good: the opacity remained below 1.0 for weeks at a time. The South Pole is therefore an excellent site for submillimeter astronomy through the austral winter and spring. The functional relationship between 492 GHz opacity and measured precipitable water vapor shows that a significant fraction of the opacity is caused by atmospheric constituents other than water vapor, indicating the need for accurate, site-dependent atmospheric modeling when opacity measurements at lower frequencies are extrapolated into the submillimeter. (Auth.)

#### K-57815

Bythrow, P.F., **Air Force Programs at APL: Flare genesis project**, *Johns Hopkins APL technical digest*, Mar. 1996, 17(1), p.117-126 (Pertinent p.119-120), 6 refs.

#### DLC TA1.J524 v.17 1996

The Applied Physics Laboratory is engaged in several diverse projects for the U.S. Air Force. These programs, which are distributed among various Laboratory departments, include flare genesis, an antarctic balloon mission to study the solar magnetic field. (Auth.)

#### K-57899

Ganga, K., Ratra, B., Gundersen, J.O., Sugiyama, N., **UCSB South Pole 1994 cosmic microwave background anisotropy**

**measurement constraints on open and flat- $\Lambda$  cold dark matter cosmologies**, *Astrophysical journal*, July 20, 1997, 484(1, Part 1), p.7-30, 105 refs.

Methods and models are developed to deal with observational uncertainties in gathering data in the UCSB SP94 experiment. Among the models considered, the full SP94 data set is most consistent with  $\Omega_0$  ca. 0.1-0.2 open models and less so with old high baryon density, low density, flat- $\Lambda$  models. The SP94 data do not rule out any of the models considered at the  $2\sigma$  level. The SP94 experiment is most sensitive to anisotropies on a somewhat larger, model-dependent, angular scale than the scale at which the window function peaks. For establishing the significance of a detection of CMB anisotropy limits are derived using the highest posterior density (HPD) prescription, since it yields smaller lower limits. Since HPD limits lead to tighter constraints on the CMB amplitude, they also provide for greater discrimination between models. Model normalizations deduced from the SP94 data subsets are mostly consistent with those deduced from the 2 yr DOBE-DMR data, although the Ka-band data prefer a normalization ca.  $1\sigma$  lower than do the Q-band data, the Q and Ka+Q data favor a slightly higher normalization for the  $\Omega_0=0.1$  open model than does the DMR, and the Ka and Ka+Q data prefer a somewhat lower normalization for the older, higher  $\Omega_B$ , low-density  $\Lambda$  models than does the DMR. (Auth. mod.)

#### K-57921

Carpenter, D.L., et al, **Probing properties of the magnetospheric hot plasma distribution by whistler mode wave injection at multiple frequencies: evidence of spatial as well as temporal wave growth**, *Journal of geophysical research*, July 1, 1997, 102(A7), p.14,355-14,362, 12 refs.

This paper discusses and illustrates the use of wave injection at multiple discrete frequencies to study temporal changes in magnetospheric hot electrons with parallel (gyroresonant) velocities in various nonoverlapping ranges. The data studied were acquired during a special 9-hour period of 1.9-2.9 kHz VLF transmissions from Siple Station to Lake Misticissini, Canada, on Jan. 23-24, 1988. The amplitudes of the leading edges of constant frequency pulses at 1900, 2150, and 2400 Hz varied independently with time. This is interpreted as evidence of a spatial amplification process that accompanied the well known and more readily identifiable phenomena of exponential temporal growth to a saturation level. Evidence of wave-hot plasma interactions showed a dependence on  $df/dt$  of the input signal frequency versus time format; in general, the slow frequency ramps showed the highest amplitudes and the fast ramps and parabolas the lowest, in agreement with past work. (Auth. mod.)

#### K-57922

Sonwalker, V.S., et al, **Properties of the magnetospheric hot plasma distribution deduced from whistler mode wave injection at 2400 Hz: ground-based detection of azimuthal structure in magnetospheric hot plasmas**, *Journal of geophysical research*, July 1, 1997, 102(A7), p.14,363-14,380, 39 refs.

Siple Station VLF wave injection experiments, aimed at finding the properties of the magnetospheric hot plasma, were conducted for a 9-hour period between 1705 and 0210 UT on Jan. 23-24, 1988. A special frequency versus time format, lasting 1 min and transmitted every 5 min, consisted of a sequence of pulses, frequency ramps, and parabolas, all in a 1-kHz range centered on 2400 Hz. At various times during the 9-hour interval the Siple signals showed features characteristic of wave-particle interactions, including wave growth, sidebands, and triggered emissions. The observations show that there were no correlations between the initial levels, the growth rates, and the saturation levels of constant-frequency pulses; in general, the values of growth rate and saturation level of two pulses injected within 30 s were nearly the same; the initial level, growth rate, and saturation level showed temporal variations over 5-15 min and 1-2 hour timescales; the leading edges of constant-frequency signals underwent spatial amplification; and under conditions of saturation the received signal bandwidth (ca. 20 Hz) remained constant over a 1-hour period, although the saturation level and growth rate varied during the same period. (Auth. mod.)

#### K-57926

Ejiri, M., ed, **NIPR Symposium on Upper Atmosphere Physics**, 19th, Tokyo, Nov. 21-22, 1995, **Proceedings of the NIPR Sym-**



**posium on Upper Atmosphere Physics, No.10**, Tokyo, National Institute of Polar Research, Jan. 1997, 180p., Refs. passim. For selected papers see G-57935, I-57931, I-57932, K-57927 through K-57930, K-57933, K-57934 and K-57936 through K-57938.

This volume contains 12 referred scientific papers, one research note and 11 extended abstracts among 59 individual contributions presented at the 19th Symposium on Coordinated Observations of the Ionosphere and the Magnetosphere in the Polar Regions, held in Tokyo on Nov. 21-22, 1995. Eight full length papers, one research note and three extended abstracts are pertinent to Antarctica and deal with auroral observations, thermosphere and middle atmosphere, HF/VHF radars, magnetosphere, geomagnetism, modeling, and conjugate points observations.

#### K-57927

Onda, K., Miyaoka, H., Itikawa, Y., Ejiri, M., **Simulation of auroral photoemission rate for the first negative band system of  $N_2^+$  at  $\lambda$  427.8 nm using electron differential number flux observed by the sounding rocket**, NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.10, Tokyo, National Institute of Polar Research, Jan. 1997, p.1-15, Refs. p.14-15.

Electron auroras observed by the sounding rocket S-310JA-8 are investigated by using the Monte Carlo method. The MSIS-86 model is employed to represent the atmospheric number density and temperature in the aurora observed at Showa Station of the invariant latitude 66.14°S and the geomagnetic longitude 70.98° on Apr. 4, 1984. Only  $N_2$ , O and  $O_2$  are taken into account as components of the atmosphere. Electrons are injected downward into the upper atmosphere at the altitude of 200 km, at which a downward electron differential number flux was measured. An initial electron energy  $E_0$  is considered in the range of 100 eV to 18 keV. The difference in the absolute intensities obtained by experiment and theory is 5% at the time X+216 s. This confirms that the Monte Carlo method is applicable to simulate collision processes and the resulting production and emission rates in electron auroras. Some representative results of emission rates are also presented for oxygen green and red lines. (Auth. mod.)

#### K-57928

Obara, T., **Akebono observations of polar cap arcs - including review**, NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.10, Tokyo, National Institute of Polar Research, Jan. 1997, p.29-41, Refs. p.39-41.

In this paper, the authors overview the observational signatures of "polar cap arcs", and discuss the more dynamical meso-scale features relating to the polar cap arc phenomena. They demonstrate recent progress on issues which have remained unanswered, based on the Akebono (EXOS-D) measurements along with simultaneous ground-based observations. They emphasize the importance of polar cap arc phenomena in understanding the basic magnetospheric processes during northward IMF conditions with some implementation plans. In Antarctica, the study of how the high latitude aurora grows and decays in response to IMF changes, is carried out by the AGO (Automated Geophysical Observatory) project. (Auth. mod.)

#### K-57929

Nishitani, N., Ogawa, T., Sato, N., Yamagishi, H., Yukimatu, A.S., Watanabe, M., **Averaged pattern of ionospheric echo region and convection: initial results from the Syowa Station HF radar**, NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.10, Tokyo, National Institute of Polar Research, Jan. 1997, p.42-49, 11 refs.

Initial results of the HF radar observations, carried out at Showa Station during Sep. 1995, are presented. SMR (summary) data, obtained on a beam aligned in the geomagnetic north-south direction, are analyzed. During quiet periods, the echo regions show a pattern similar to a quiet auroral oval, indicating that most of ionospheric irregularities are caused by an auroral particle precipitation and/or strong electric fields. As the geomagnetic activity increases, the echo regions expand to lower latitudes and the velocity amplitudes increase. In general, the Doppler velocity pattern clearly shows a two-cell convection. (Auth. mod.)

#### K-57930

Ondoh, T., **Characteristics of polar cusp VLF emissions observed by ISIS satellites of low altitude polar orbit**, NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.10, Tokyo, National Institute of Polar Research, Jan. 1997, p.50-63, 19 refs.

Characteristics of polar cusp hiss and other VLF emissions observed in the cusp region are studied using f-t spectra and narrow-band intensity data at 6 frequencies, which were processed from VLF electric field satellite data received at Showa Station. The polar cusp hiss is very irregular in frequency, intensity and time (or space). It occurs over several hours, centered around the geomagnetic noon in geomagnetic local time, for a few minutes in UT on ISIS west to east passes. The regions of polar hiss with curtain-like f-t spectrum lie on both sides of the polar cusp hiss region. The irregular and structured spectra of polar cusp hiss and saucer emissions may reflect irregular and structured electron precipitation in the cusp region. The polar cusp VLF emissions, such as the polar cusp hiss and VLF saucers, occur at invariant latitudes from 72° to 86° and at geomagnetic local times, from 09 to 15 hours. The polar cusp VLF hiss is discussed in terms of the whistler-mode cherenkov radiations generated from downgoing electrons in the polar magnetosphere. (Auth. mod.)

#### K-57933

Nakagawa, M., et al, **Measurement of cosmic-ray protons during polar patrol balloon experiment in Antarctica**, NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.10, Tokyo, National Institute of Polar Research, Jan. 1997, p.91-96, 10 refs.

To study cosmic protons, helium and CNO components ( $E=100-500$  MeV/n) together with Hard X-rays ( $E=30-120$  keV) of auroral, solar and/or cosmic origins, the Polar Patrol Balloon no.6 (PPB#6) was launched from Showa Station on Jan. 5, 1993 by the 34th Japanese Antarctic Research Expedition. PPB#6 moved westward by 1.5 circumpolar rounds over Antarctica covering 6-13 g/cm<sup>2</sup> atmospheric depth and 63°-70°S geographic latitude. The cosmic radiation intensity was measured by detector system on PPB#6. This paper shows the cosmic proton intensity as a function of the geomagnetic rigidity and the proton spectra at invariant latitude of 55°, 80°, and at the cusp latitude. (Auth.)

#### K-57934

Tsutsumi, M., et al, **MF radar observations of antarctic mesosphere and lower thermosphere**, NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.10, Tokyo, National Institute of Polar Research, Jan. 1997, p.109-116, Refs. p.115-116.

Plans to construct an MF radar observatory at Showa Station in 1999 are discussed. The MF radar observations of horizontal neutral wind velocity (60-100 km) are characterized by high time-height resolutions of 2 min-4 km and the continuous operation throughout a day, which enables one to observe various atmospheric phenomena over wide frequency range, from gravity waves to planetary waves. The authors also discuss the importance of combined observations with other measurement techniques, like Na lidar, FPI, all-sky imager and HF radar, as well as international cooperative studies through global atmospheric radar networks. (Auth. mod.)

#### K-57936

Watanabe, O., Saka, O., Baker, D.N., **Particle injection events during auroral break-up's as observed by off-midnight satellite (extended abstract)**, NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.10, Tokyo, National Institute of Polar Research, Jan. 1997, p.147-150, 3 refs.

Injection of energetic particles observed near the geosynchronous orbit is one of the characteristic features of the substorm expansion phase. The authors carried out the drift trajectory analysis of the substorm event that occurred at 2210 UT ( $K_p=2$ ) on Apr. 18, 1986 to infer the substorm injection region and the injection time. Using this method, they studied the correlation of particle injection events with a concurrent auroral break-ups measured by a ground-based optical observation. A figure shows all the data used in this study.



**K-57937**

Saka, O., et al, **Modulation of Pc 3 amplitude and associated auroral precipitation (extended abstract)**, NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.10, Tokyo, National Institute of Polar Research, Jan. 1997, p.160-164, 8 refs.

The authors report a close correlation between an occurrence of magnetic pulsations (Pc 3) and a concurrent enhancement of auroral precipitations by comparing data from three ground stations, one at high latitude of nightside sector (Showa Station) and the other two stations at very-low latitude of dayside sector (Melekeok and Okinawa). All-sky image and induction magnetometer data from Showa Station and fluxgate magnetometer data from Melekeok/Okinawa were utilized in this report.

**K-57938**

Hirasima, Y., et al, **Correlations between X-rays, VLF emissions and magnetic pulsations observed at Syowa-Tjörnes conjugate-pair stations near L ca.6 (extended abstract)**, NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.10, Tokyo, National Institute of Polar Research, Jan. 1997, p.170-175, 8 refs.

X-ray data of 1 s time resolution was available in the period of 0855 UT (0914 MLT) to 1630 UT (1614 MLT) on Jan. 5, 1993, when the Polar Patrol Balloon No.6 was located within the real-time telemetry range of Showa Station. Temporal variations of X-rays in the energy range of 30-120 keV were compared with ground-based data of magnetic pulsations, VLF emissions and CNA at 30 MHz observed at Showa Station and at Tjörnes, in Iceland, the geomagnetic conjugate point of Showa in the Antarctic. Results are discussed and shown in figures.

**K-58000**

Fujimoto, M., et al, **Dayside reconnected field lines in the south-dusk near-tail flank during an IMF  $B_y > 0$  dominated period**, *Geophysical research letters*, Apr. 15, 1997, 24(8), p.931-934, 9 refs.

A prolonged period of  $B_y > 0$  dominated IMF conditions was monitored on Dec. 18-19, 1994. Observations on convection over the southern polar cap in the middle of this period were available from AKEBONO. Detection of the well-known dawn-to-dusk flow observing simultaneously energy-dispersed ions in the cusp strongly indicates that the field lines reconnected at the dayside were azimuthally accelerated. GEOTAIL data prove that this near-tail flank region in the Southern Hemisphere is filled with azimuthally accelerated flux tubes that are loaded with solar wind plasma. (Auth. mod.)

**K-58082**

Arisawa, T., Kato, Y., Otaka, K., Inamori, Y., Kaneko, M., Taguchi, M., **Upper atmosphere physics data obtained at Syowa Station in 1995**, *Japanese Antarctic Research Expedition. JARE data reports*, Mar. 1997, No.225, 204p., 16 refs.

This report summarizes upper atmosphere physics data acquired by JARE-36 with the Upper Atmosphere Physics Monitoring (UAPM) System at Showa Station in 1995. The items of observation are as follows: geomagnetism; ULF-VLF waves; ionosphere (cosmic noise absorption at 30 MHz); and aurora. An outline of the system, specifications of the observation instruments, the recording periods, and the format of the compiled digital data are included. Summary plots for Jan.1-Dec. 31, 1995 are appended.

**K-58084**

Inamori, K., Ichinose, M., **Radio observation data at Syowa Station, Antarctica during 1995**, *Japanese Antarctic Research Expedition. JARE data reports*, Mar. 1997, No.226, 181p.

Absorption of cosmic radio noise has been observed at Showa Station with a standard riometer at 30 MHz since Feb. 1966. This report presents data observed between Jan. 1 and Dec. 31, 1995. Besides the observed riometer data, other observation data are presented in the combined data plots for reference. These plots include geomagnetic field, HF, VLF, and radar observations. A bibliography relevant to riometer records of 30 MHz cosmic noise at Showa Station between 1967 and 1994 is included.

**K-58085**

Inamori, K., Ohtaka, K., Igarashi, K., **Records of radio aurora at Syowa Station, Antarctica in 1995 and 1996**, *Japanese Antarctic Research Expedition. JARE data reports*, Mar. 1997, No.227, 27p., 2 refs.

A summary of data obtained with the auroral radar at Showa Station from Feb. 1995 to Jan. 1996 is presented. The available data include chart records of the time variation of echo intensity and digital records of echo intensity and doppler velocity. A brief explanation of diagrams and a bibliography relevant to records of radio aurora at Showa Station from 1966 to 1994 are also presented.

**K-58086**

Iwasaki, K., Yamaguchi, T., Igarashi, K., **Records of radio aurora at Syowa Station, Antarctica in 1993 and 1994**, *Japanese Antarctic Research Expedition. JARE data reports*, Mar. 1997, No.220, 18p., 1 ref.

A summary of data obtained with the auroral radar at Showa Station in 1993 and 1994 is presented. The available data include chart records of the time variation of echo intensity and digital MT. A brief explanation of diagrams and a bibliography relevant to records of radio aurora at Showa Station from 1966 to 1992 are also presented.

**K-58112**

Ko, Y.K., Fisk, L.A., Geiss, J., Gloeckler, G., Guhathakurta, M., **Empirical study of the electron temperature and heavy ion velocities in the south polar coronal hole**, *Solar physics*, Apr. 1997, 171(2), p.345-361, 26 refs.

Electron temperature, electron density, and the velocity of the ions are the three main physical quantities which determine the freeze-in process, and thus the solar wind ionic charge states. These physical quantities are determined by the heating and acceleration of the solar wind, as well as the geometry of the expansion. The authors present a parametric study of the electron temperature profile and velocities of the heavy ions in the inner solar corona. They use the ionic charge composition data observed by the SWICS experiment on *Ulysses* during the south polar pass to derive empirically the electron temperature profile in the south coronal hole. The electron temperature profile in the solar inner corona is well constrained by the solar wind charge composition data. The data also indicate that the electron temperature profile must have a maximum within 2 solar radii. Also, the velocities of heavy ions in their freeze-in regions are small ( $<100$  km/s) and different elements must flow at different velocities in the inner corona. (Auth. mod.)

**K-58113**

Feffer, P.T., et al, **Solar energetic ion and electron limits from HIREGS observations**, *Solar physics*, Apr. 1997, 171(2), p.419-445, 55 refs.

The High-REsolution Gamma-ray and hard X-ray Spectrometer (HIREGS) consists of an actively shielded array of twelve liquid-nitrogen-cooled germanium detectors designed to provide unprecedented spectral resolution and narrow-line sensitivity for solar gamma-ray line observations. Two long-duration, circumpolar balloon flights of HIREGS in Antarctica (Jan. 10-24, 1992 and Dec. 31, 1992-Jan. 10, 1993) provided 90.9 and 20.4 hours of solar observations, respectively. During the observations, eleven soft X-ray bursts at C levels and above (largest M1.7) occurred, and three small solar hard X-ray bursts were detected by the Compton Gamma-Ray Observatory. HIREGS detected a significant increase above 30 keV in one. No solar gamma-ray line emission was detected. (Auth. mod.)

**K-58127**

Arriagada, M.A., Foppiano, A.J., Buonsanto, M.J., **Solar activity variations of meridional winds over King George Island, Antarctica**, *Journal of atmospheric and solar-terrestrial physics*, Aug. 1997, 59(12), p.1405-1410, 15 refs.

Diurnal variations of the magnetic meridional component of thermospheric neutral winds are derived for King George I. Input values are F-region peak heights determined from ionosonde data using a well known empirical equation. Ionosonde data correspond to conditions of low geomagnetic activity and both low and high solar activity level for all seasons.



These diurnal variations are compared with corresponding variations calculated with the HWM90 model, and solar activity trends of the mean value and diurnal amplitude are examined. (Auth. mod.)

#### K-58135

Urashima, A., Fujita, A., Aso, T., **Study of the reconstruction algorithm for auroral tomography by numerical simulation**, *Antarctic record*, July 1997, 41(2), p.469-496, In Japanese with English summary. 11 refs.

The authors have been studying reliable reconstruction of auroral luminous forms from simultaneously observed multiple tomographic images. Recent international collaborative observation has made it possible to obtain simultaneous auroral images at 4-6 observing sites. Here, they investigate the reconstruction algorithms which can be applied to auroral tomographic inversion. Analytical algorithms such as a back projection with filtering method and algebraic ones such as MART (Multiplicative Algebraic Reconstruction Technique), SIRT (Simultaneous Iterative Reconstruction Technique) and a pseudo inverse matrix method are studied along with a relevant constraint called the p-approximation. Numerical simulation for these methods shows that MART and SIRT are superior to the other methods, and also the p-approximation works well for aurora locations having poor observing conditions. (Auth.)

#### K-58172

Yang, S.F., Du, A.M., Chen, B.S., **Observation and analyses of geomagnetic pulsations at Zhongshan Station, Antarctica**, *Chinese journal of polar research*, Mar. 1997, 9(1), p.58-65, In Chinese with English summary. 10 refs.

The data on various geomagnetic pulsations observed at Zhongshan Station from Feb. 9, 1992 to Feb. 9, 1993 are analyzed and the excitation mechanisms of pulsations at the polar cusp are discussed, including the phenomena of upper atmospheric electromagnetic environment and the interaction between solar wind and the magnetosphere at the polar cusp. (Auth. mod.)

#### K-58258

Korotova, G.I., Sibeck, D.G., Rosenberg, T.J., Russell, C.T., Friis-Christensen, E., **High-latitude ionospheric transient events in a global context**, *Journal of geophysical research*, Aug. 1, 1997, 102(A8), p.17,499-17,508, 47 refs.

This paper presents a comprehensive global study of bow shock motion, magnetosheath dynamic pressure variations, dayside magnetospheric magnetic field perturbations, and cosmic noise absorption events attending a sequence of transient events observed in high-latitude global ground magnetograms on Feb. 14, 1986. ISEE 2 spacecraft observations indicated that most of the transient ground magnetometer events were associated with abrupt inward and outward motions of the dawn bow shock during a prolonged period of strongly northward and orthospiral interplanetary magnetic field orientation. (Auth. mod.)

#### K-58349

Escoubet, C.P., Bosqued, J.M., Hoffman, R.A., Berthelier, A., Anderson, P.C., **Opposite ion dispersions observed quasi-simultaneously in the polar cusp by the DE-2 and Aureol-3 satellites**, *Geophysical research letters*, Oct. 15, 1997, 24(20), p.2487-2490, 11 refs.

In Aug. 1982 the satellites Dynamics Explorer 2 (DE-2) and Aureol-3 (A-3) crossed around the same time the southern polar cusp. DE-2 detected the cleft in the prenoon sector constituted by a poleward ion dispersion. A-3 detected a diffuse ion precipitation, immediately followed by an equatorward dispersion (energy increases when the latitude increases). The observations are explained as the merging of the interplanetary magnetic field with the geomagnetic lobe field lines which produces the dispersion observed at high latitude on A-3 and the low energy step observed by DE-2. (Auth. mod.)

See also:

A-57537 E-57277 F-57712 F-57713 G-57935 I-56984 I-57307  
I-57384 I-57932 I-58321



## L. TERRESTRIAL PHYSICS

### L-56352

Kanao, M., Kubo, A., **Report on workshop "Public use and scientific study of broadband seismic data at Syowa Station, Antarctica"**, *Antarctic record*, July 1996, 40(2), p.259-266, In Japanese with English summary. 1 ref.

The workshop "Public Use and Scientific Study of Broadband Seismic Data at Showa Station, Antarctica" was held on Jan. 25, 1996 at the National Institute of Polar Research, with 12 participants. The history and present status of seismic observations were reviewed, followed by presentations concerning scientific studies using broadband data in Antarctica. The main contributions consisted of studies of the velocity structure and anisotropy in the crust and upper mantle, using short-period body waveforms and travel time data, and analyses of the heterogeneity and anisotropy of seismic wave velocity in the core and the lower-most mantle, by using short period core phases and free oscillations of the Earth. Data archiving, public use and future plans of the Japanese Antarctic Research Expedition were discussed in relation to the above scientific results. (Auth.)

### L-56358

Quidelleur, X., Valet, J.P., **Geomagnetic changes across the last reversal recorded in lava flows from La Palma, Canary Islands**, *Journal of geophysical research*, June 10, 1996, 101(B6), p.13,755-13,773 (Pertinent p. 13,768-13,773), 66 refs.

Two adjacent sequences of 41 and 21 individual lava flows have been sampled in the island of La Palma. Although no detailed correlation can be established between the two sections, they both encompassed the Matuyama-Brunhes (M-B) reversal. Stepwise alternating field (AF) and thermal demagnetization in air and in vacuum accompanied by investigations of the rock magnetic properties allowed us to identify several lava flows with the same signature and thus most likely associated with very short episodes of intense volcanic activity. In the cited pertinent pages with inclusive figures, the volcanic record is illustrated as it pertains to the virtual geomagnetic pole moving to and between both polar regions. (Auth. mod.)

### L-56473

Bhattacharya, B.B., Majumdar, T.J., **Bedrock elevation studies in Queen Maud Land, Antarctica**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.35-41, 12 refs.

DLC G850.I53I53 1984

A magnetic anomaly map prepared from the MAGSAT data over the Ross Ice Shelf has been correlated with the available bedrock elevation data to develop a model which has been subsequently used to generate the bedrock elevation data in Queen Maud Land region of Antarctica. The results are in agreement with some control data available from the Queen Maud Land region. (Auth.)

### L-56475

Verma, S.K., Mital, G.S., Rambabu, H.V., Venkatarayudu, M., Srinathareddy, K.N., **Magnetic survey over the ice-shelf around the Indian permanent station in Antarctica**, Scientific report of Fourth Indian Scientific Expedition to Antarctica, Technical publication No.4, New Delhi, India, Department of Ocean Development, 1987, p.55-67, 10 refs.

DLC G850.I53I53 1984

The results presented here relate to the magnetic investigations carried out around the Dakshin Gangotri Station on the ice shelf during the Fourth Indian Antarctic Expedition. Magnetic measurements were made along a 33 km long N-S traverse starting right from the northern edge of the shelf to the region where deep water channels occur. The observed profile was interpreted using a number of geophysical methods. Utilizing the

magnetic data obtained in earlier surveys it has been possible to delineate sub-shelf trends in the graben or rift-zone like structure of the basement. This structural pattern is supported by the marine seismic and magnetic work carried out in Lazarev Sea during the first Indian expedition and by the geological studies hypothesizing the existence of extensive grabens. (Auth.)

### L-56513

Kanao, M., Kubo, A., Shibutani, T., **Crustal velocity models of shear waves in East Antarctica by receiver function inversion of broadband waveforms**, NIPR Symposium on Antarctic Geosciences, Proceedings. No.9, Tokyo, National Institute of Polar Research, 1996, p.1-15, Refs. p.14-15.

Receiver functions from teleseismic earthquakes recorded with broadband seismographs at Dumont d'Urville Station (DRV) and Mawson Station (MAW) are inverted for shear wave velocity models of the crust and uppermost mantle beneath the recording stations. The obtained models are compared with the previously obtained ones at Showa Station (SYO) to clarify the relationship with regional tectonic history. A crustal velocity model around DRV derived from 18 events indicates a rather sharp Moho at a depth of 38 km and somewhat less fluctuation within the crust. It might have originated in the Early Proterozoic metamorphism in Adélie Land. High velocity zones in the upper crust together with low velocity discontinuity of the mid-crust may also have a relation to past tectono-thermal activity. A crustal velocity model around MAW determined by using 20 events has a very sharp Moho at 42 km depth that might have developed under high pressure and a thickened crust when a metamorphic event occurred around Mac. Robertson Land in the Late Proterozoic ages. Variation in the crustal velocities at MAW is intermediate among the three stations, which may also have been created by the regional metamorphism. (Auth.)

### L-56514

Kaminuma, K., **On the possibility of detecting absolute crustal uplift at Syowa Station, Antarctica**, NIPR Symposium on Antarctic Geosciences, Proceedings. No.9, Tokyo, National Institute of Polar Research, 1996, p.16-23, 14 refs.

There is a great deal of evidence showing crustal uplift, after deglaciation, in the vicinity of Showa Station from tide gauge data, seismic evidence, raised beaches, marine terraces, etc. Local earthquake activity corroborates the crustal uplift, and it is an intermittent phenomenon. Sea level falling of 4.5 mm/y was found using 1975-1992 data. This falling rate is consistent with geomorphological data. If the crustal uplift of 5 mm/y continues for 10 years, the total uplift obtained will be 5 cm. The total amount of the vertical crustal uplift would produce a change of about 15  $\mu$ Gal in gravity. Repeated measurements of absolute gravity over many years might detect absolute value of vertical crustal movement. Absolute gravity measurements at Showa Station were made to establish one of the IAGBN (International Absolute Gravity Basestation Network) stations. Continuous observation by a SCG (Superconducting Gravimeter) was also started at Showa Station. The SCG observation is believed to provide the highest sensitivity and highest resolution data for study of vertical crustal movement. Using the absolute gravimeter together with the SCG will provide significant insight into the absolute elevation change. (Auth.)

### L-56515

Golynskii, A.V., Masolov, V.N., Nogi, Y., Shibuya, K., Tarlowsky, C., Wellman, P., **Magnetic anomalies of Precambrian terranes of the East Antarctic shield coastal region (20°E-50°E)**, NIPR Symposium on Antarctic Geosciences, Proceedings. No.9, Tokyo, National Institute of Polar Research, 1996, p.24-39, Refs. p.38-39.

Extensive regional magnetic survey flights with a line-spacing of about 20 km were conducted in 1972, 1986, 1988 and 1990 over the coastal region of East Antarctica. The flights total more than 34,000 line-



km of total magnetic intensity data acquired along north-south trending profiles. Magnetic anomaly maps compiled from digital data provide a synoptic view of major magnetic anomalies and the corresponding tectonic/geologic features of the eastern Queen Maud Land and the western Enderby Land. Availability of digital data allowed an application of various enhancement techniques and provided new interpretative information from the magnetic anomalies. The filtered and shaded relief maps have characteristic anomaly patterns (trends, amplitudes and wavelengths) which correlate with Precambrian tectonic features of the extensive Late Proterozoic area, and of the Archaean cratonic block of Enderby Land (Napier Complex). Of particular interest is the linear magnetic anomaly observed along the continental slope and shelf area; the Antarctic Continental Margin Magnetic Anomaly. This is a continental-scale crustal discontinuity formed during the Gondwana breakup. (Auth. mod.)

#### L-56547

Verma, S.K., Rao, M.B.S.V., Gopal, B.V., **Gravity survey (helicopter supported) between Schirmacher Oasis and Wohlthat Mountains, Dronning Maud Land, Antarctica**, Scientific report of Ninth Indian Expedition to Antarctica, Technical publication No.6, New Delhi, India, Department of Ocean Development, 1994, p.209-217, 1 refs.

The helicopter-borne magnetic survey conducted between the Schirmacher Ponds and the Wohlthat Mountains during the 7th Indian antarctic expedition revealed a number of interesting anomaly zones in the region. To study some of these features in detail, a helicopter supported gravity survey was conducted during the 9th Indian antarctic expedition. Details of the logistics planning, data acquisition, processing and interpretation relating to this survey are described. (Auth.)

#### L-56562

Grunow, A.M., Kent, D.V., Dalziel, I.W.D., **New paleomagnetic data from Thurston Island: implications for the tectonics of West Antarctica and Weddell Sea opening**, *Journal of geophysical research*, Oct. 10, 1991, 96(B11), p.17,935-17,954, 78 refs.

DLC QC811.J6

A scenario of paleo-events is presented as a series of rotations, relative to East Antarctica, of three crustal blocks between 230Ma and 110Ma. The individual blocks, Antarctic Peninsula, the Ellsworth-Whitmore Mountains complex, and Thurston Island-Eights Coast, are considered as an entity nominated Weddellia. The driving force behind the counter-clockwise rotations appears to have been the opening of the Mozambique-Somali-Weddell Sea basins. A change in the opening history of the Weddell Sea basin caused by the initiation of spreading in the South Atlantic Ocean basin at about 130Ma probably started Weddellia's clockwise rotation.

#### L-56582

Lodolo, E., Schreider, A.A., Coren, F., **Sea-floor spreading in the easternmost Indian Ocean reveals cyclicity in ocean crust accretion (0-36 Ma)**, *Marine geology*, Oct. 1996, 134(3-4), p.249-261, 28 refs.

A new map of chrons (C1-C20) from the easternmost Australian-Antarctic ridge segment to the western Ross Sea is presented, and rates of ocean crust accretion are calculated. The spreading process in this sector of the southern ocean is not uniform. A very clear magnetic anomaly profile across the Australian-Antarctic plate boundary has allowed a detailed definition of the magnetic anomalies and a fine scale assessment of the spreading rate. Substantial asymmetry of spreading between the northern and southern flanks of the ridge axis has been revealed in the 2.15-4.29 Ma time interval. The linear regression of the instantaneous spreading velocity distribution calculated south of the ridge axis along a flow-line shows a general trend with decreasing rates vs. time from 36 Ma to the present. These results are in agreement with those obtained computing instantaneous velocities for the conjugate northern flank of the Australian-Antarctic ridge segment. (Auth. mod.)

#### L-56588

Henry, B., Plessard, C., **New palaeomagnetic results from the Kerguelen Islands**, *Geophysical journal international*, Jan. 1997, 128(1), p.73-83, Refs. p.81-83.

New palaeomagnetic analyses have been carried out in the Kerguelen Is. on 32 lava flows of well-established age (20-22 Ma). Combined with previous studies, they yield a reliable pole for the Lower Miocene for the antarctic plate: N=59 flows, 349.9°E, 83.5°S,  $A_{95}=6.1^\circ$ . A reversal sequence reversed-normal has been identified in the Port Jeanne d'Arc section. (Auth. mod.)

#### L-56619

Rangarajan, G.K., Dhar, A., **Comparative study of quiet day variation of the geomagnetic field at Dakshin Gangotri (India) and Novolazarevskaya (USSR) in Antarctica**, Scientific report of Fifth Indian Expedition to Antarctica, Technical publication No.5, New Delhi, India, Department of Ocean Development, 1988, p.353-361, 5 refs.

DLC G850.I53 I53

A comparative study of the quiet day features of the geomagnetic field was carried out at two nearby antarctic stations, the Dakshin Gangotri and the Novolazarevskaya. It was found that the diurnal variation patterns at both stations were comparable, but not on a one-to-one basis, with the H component showing a significant difference. The day-to-day variability in the field at both stations was largest near 04 hours UT, perhaps close to the 'Harang' discontinuity. The variability in the meridional component (D), being least, was in conformity. (Auth. mod.)

#### L-56639

Nair, K.U., **Report of geomagnetic observations carried out in Antarctica during the period March-December 1991**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.93-96.

A three-component flux gate magnetometer was installed at Maitri Station to obtain a continuous record of magnetic field changes in H, Z and D components. Details of the installation are given. Data collected are discussed and presented in tables. (Auth. mod.)

#### L-56645

Sarma, V.N., **Establishment of gravity stations around Indian Station in Antarctica by NGRI**, Scientific report, Tenth Indian Expedition to Antarctica, Technical publication No.8, New Delhi, India, Department of Ocean Development, 1995, p.155-158.

Description of eighteen gravity bases, established by the National Geophysical Research Institute during 1990-91 around Maitri Station, together with their observed gravity value, elevation, position location, Bouguer anomaly value and free air anomaly, are the subject matter of this work. The procedure followed in establishing these bases is discussed and their accuracy is described. (Auth. mod.)

#### L-56895

Debayle, E., L  v  que, J.J., **Upper mantle heterogeneities in the Indian Ocean from waveform inversion**, *Geophysical research letters*, Feb. 1, 1997, 24(3), p.245-248, 18 refs.

A waveform inversion method is applied to 156 Love and Rayleigh wave seismograms to build up a 3-D model of the shear velocity in the upper mantle beneath the Indian Ocean. The first step of the method consists in finding, for each path, a radially stratified upper mantle model compatible with the Love and Rayleigh wave seismograms relative to that path. The fundamental mode and few higher modes are modelled in the waveform inversion. In a second step, the models related to the different paths are used in a tomographic inversion to map the 3-D upper mantle structure. The 3-D velocity model has a lateral resolution of 1000 km. No significant velocity anomalies are found below 300 km, although the resolution is still good. Continental roots are confined to the upper 300 km and low velocities below mid-oceanic ridges to the upper 250 km, depending on their spreading rates. At shallow depths (<80 km), the authors find a positive velocity anomaly beneath the West Indian ridge near the Rodriguez triple junction, where gravimetric and bathymetric data indicate a reduced volcanic activity. (Auth. mod.)

#### L-56982

Otto-Bliesner, B.L., Upchurch, G.R., **Vegetation-induced warming of high-latitude regions during the Late Cretaceous**



period, *Nature*, Feb. 27, 1997, 385(6619), p.804-807, 35 refs.

A global climate model for the latest Cretaceous (66 mya) is used to examine the role played by high- and mid-latitude forests in surface temperature regulation. In simulations, this forest vegetation warms the global climate by 2.2°C. The low-albedo deciduous forests cause high-latitude land areas to warm, which then transfer more heat to adjacent oceans, thus delaying sea-ice formation and increasing winter temperatures over coastal land. Overall, the inclusion of some of the physical and physiological climate feedback effects of high-latitude forest vegetation in these simulations reduces the existing discrepancies between observed and modelled climates of the latest Cretaceous, suggesting that these forests may have made an important contribution to climate regulation during periods of global warmth.

#### L-57086

Kanao, M., **Variations in the crustal structure of the Lützow-Holm Bay region, East Antarctica using shear wave velocity, *Tectonophysics***, Feb. 28, 1997, 270(1-2), p.43-72, Refs. p.69-72.

Crustal structure in the Lützow-Holm Bay region (LHB), East Antarctica, is studied by analyzing seismic waveforms derived from records in the vicinity of Showa Station. One-dimensional crustal models for shear waves, in particular, are obtained in order to investigate crustal heterogeneity. In the continental backazimuths, a difference in crustal velocities is recognized between metamorphic terrain of granulite facies and the granulite-amphibolite transitional zone. Shear velocity models are compared with crustal reflectivity derived from the analysis of refraction data on the Mizuho Plateau. The reflective layers are found at depths of 24-45 km and appear to be related to the Bouguer gravity anomalies. By correlating the seismic models of crustal structure with other geophysical and geological evidence, the crustal evolution in LHB can be explained to the regional metamorphism at 500 Ma and the last break-up of Gondwana at 150 Ma. (Auth. mod.)

#### L-57269

Operto, S., Charvis, P., **Deep structure of the southern Kerguelen Plateau (southern Indian Ocean) from ocean bottom seismometer wide-angle seismic data, *Journal of geophysical research***, Nov. 10, 1996, 101(B11), p.25,077-25,103, Refs. p.25,101-25,103.

Wide-angle seismic data collected during the Kerguelen ocean bottom seismometer experiment provide the first images of the deep structure of the southern Kerguelen Plateau and support a new interpretation of the origin of the plateau. Velocity models based on travel time inversions and reflectivity synthetic seismograms show a 22-km thick crust composed of ca. 1.6 km of sedimentary cover, ca. 5.3 km of upper crust, ca. 11.0 km of lower crust, and a 4- to 6-km thick reflective zone immediately above Moho. Velocities in the upper crust are consistent with the basaltic nature of this layer. Velocities in the lower crust increase continuously from 6.60 km/s at the top to 6.90 km/s at 19.5 km depth. The reflective zone at the base of the crust consists of alternating high- and low-velocity layers with an average velocity of 6.70 km/s in the NNW-SSE direction and  $\geq 6.90$  km/s in the perpendicular direction. Strong azimuthal anisotropy is also observed in the upper mantle. The absence of high velocities at the base of the crust that characterizes many large-volume mafic provinces, the reflective lower crust, and anisotropy in upper mantle suggest that the southern Kerguelen Plateau represents a stretched continental fragment overlain by basaltic flows isolated from the antarctic margin during the early opening of the Indian Ocean. (Auth. mod.)

#### L-57520

Thistlewood, L., Leat, P.T., Millar, I.L., Storey, B.C., Vaughan, A.P.M., **Basement geology and Palaeozoic-Mesozoic mafic dykes from the Cape Meredith Complex, Falkland Islands: a record of repeated intracontinental extension, *Geological magazine***, May 1997, 134(3), p.355-367, Refs. p.365-367.

Mafic dykes (Groups A-D) intruded into Mesoproterozoic basement amphibolites, gneisses, and granitoids of the Cape Meredith Complex on the southern tip of West Falkland, provide an important record of at least three periods of lithospheric extension during Palaeozoic and Jurassic times. The youngest, Group D, dykes are part of the widespread Jurassic

Gondwana province. This group contains an oceanic island basalt-like sample and an enriched sample similar to both Group A lamprophyres and to the Jurassic Ferrar province in Antarctica. (Auth. mod.)

#### L-57521

Trouw, R.A.J., Passchier, C.W., Simões, L.S.A., Andreis, R.R., Valeriano, C.M., **Mesozoic tectonic evolution of the South Orkney Microcontinent, Scotia arc, Antarctica, *Geological magazine***, May 1997, 134(3), p.383-401, Refs. p.399-401.

The South Orkney Is. are the exposed part of a continental fragment on the southern limb of the Scotia arc. The islands are to a large extent composed of metapelites and metagreywackes of probable Triassic sedimentary age. Deformation related to an accretionary wedge setting, with associated metamorphism from anchizone to the greenschist facies, are of Jurassic age (176-200 Ma). On Powell I., in the center of the archipelago, five phases of deformation are recognized. The first three, associated with the main metamorphism, are tentatively correlated with early Jurassic subduction along the Pacific margin of Gondwana. D<sub>4</sub> is a phase of middle to late Jurassic crustal extension associated with uplift. This extension phase may be related to opening of the Rocas Verdes basin in southern Chile, associated with the breakup of Gondwanaland. (Auth. mod.)

#### L-57653

Kirschvink, J.L., Ripperdan, R.L., Evans, D.A., **Evidence for a large-scale reorganization of Early Cambrian continental masses by inertial interchange true polar wander, *Science***, July 25, 1997, 277(5325), p.541-545, Numerous refs.

Analysis of Vendian to Cambrian paleomagnetic data shows anomalously fast rotations and latitudinal drift for all of the major continents, including Antarctica. These motions are consistent with an Early to Middle Cambrian inertial interchange true polar wander event, during which Earth's lithosphere and mantle rotated about 90° in response to an unstable distribution of the planet's moment of inertia. The proposed event produces a longitudinally constrained Cambrian paleogeography and accounts for rapid rates of continental motion during that time. (Auth.)

#### L-57660

Tanaka, T., Kanao, M., **Performance test of seismic data loggers in Antarctica, *Antarctic record***, Nov. 1996, 40(3), p.333-346, In Japanese with English summary. 5 refs.

During JARE-36, from Feb. 1995 to Jan. 1996, seismic observations using data loggers around Showa Station were carried out. Experiments to evaluate the performance of the loggers under meteorological conditions of Antarctica, such as low temperature, showed that the loggers operated normally when a heater and blanket were used as protection against the cold. However, high voltage offsets and increasing input noise are seen at temperatures below -40°C. In the spring and summer seasons, observations were carried out without any problems. (Auth. mod.)

#### L-57771

Hase, H., Nothnagel, A., **ERS/VLBI Station O'Higgins in Antarctica, *Bonn. Rheinischen Friedrich-Wilhelms-Universität. Geodätisches Institut. Mitteilungen***, 1993, No.81, Working Meeting on European VLBI for Geodesy and Astrometry, 9th, Bad Neuenahr, Germany, Sep. 30-Oct. 1, 1993. Proceedings. Edited by J. Campbell and A. Nothnagel, p.87-97, 1 ref.

#### DLC QB296.E9W67 1993

The antarctic ERS/VLBI-Station O'Higgins performed the first successful geodetic VLBI experiments during the burst in Jan.-Feb. 1993. The facility is introduced and the first results are presented. (Auth.)

#### L-57827

Del Rey, R., Risso, C., Ortiz, R., Olmedillas, J.C., **Seismic network of the South Shetlands and the Antarctic Peninsula [Red sísmica del las islas Shetland del Sur y Península Antártica], *Actas del V Simposio Español de Estudios Antárticos***. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.91-101, In Spanish with English summary. 4 refs.



Within the Scientific and Technical Cooperation Programme between Spain and Argentina, a seismic network of five digital seismic stations was installed at the Spanish Juan Carlos I Station and at 4 Argentine antarctic stations. The range of distance is from 100 to 600 km among them. This network monitors the seismic activity of the Bransfield area and can detect events up to a top magnitude of 3.5 because of high noise. Until now, analysis of data shows several types of events: deep earthquakes, shallow earthquakes, tremors and a big number of icequakes because of the movements of huge icebergs and glaciers near the seismic stations. (Auth. mod.)

#### L-57828

Suriñach, E., Galindo-Zaldivar, J., Maldonado, A., **Magnetic anomalies between the Antarctic Peninsula and the South Orkney Is.** [Interpretación de las anomalías magnéticas de gran amplitud entre la Península Antártica y el microcontinente de las Orcadas del Sur], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.103-117, In Spanish with English summary. Refs. p.115-117.

The magnetic profiles recorded during the HESANT 92-93 cruise of the R/V *Hesperides* show great amplitude anomalies along a broad band located at the northern boundary of the Powell Basin. The amplitudes reach 1000 nT and their width is up to 100 km. The interpretation of these magnetic anomalies in 4 profiles with NNW-SSE direction, using interactive modelling and two-dimensional bodies, allow to determine the main features of the anomalous bodies in the fragments of the continental crust. The bathymetry data agree with the morphology of the bodies. Also confirmed is the agreement of the location of the anomalous bodies with the acoustic basement of the multichannel seismic profiles. The anomalous bodies are probably basic plutonic rocks, similar to those that crop-out in the Antarctic Peninsula. In the eastern and western margins of the Powell Basin, areas with magnetic anomalies are recognized which can represent the continuation of the southern branch of anomalies of the Antarctic Peninsula. (Auth. mod.)

#### L-57829

Catalán, M., Rincón, C., Soler, M., **Model for magnetic anomalies in the Bransfield Strait area** [Las anomalías magnéticas en el mar de Bransfield. Un modelo geofísico de interpretación], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.119-137, In Spanish with English summary. Refs. p.134-136.

This paper presents a new geophysical model in agreement with aeromagnetic surveys carried out from 1987 to 1991 in West Antarctica. It includes a proposal for the geological components of the South Shetland Is., the Bransfield Strait and the Antarctic Peninsula. The model identifies the South Shetlands' positive anomalies, with basic and ultrabasic andean-series outcroppings suggesting an increasing magnetic susceptibility in the direction of the Livingston-Deception zone; rift structures are identified with positive anomalies showing a bifurcation in that area. (Auth. mod.)

#### L-57830

Blanco, I., García, A., Catalán, M., Torta, J.M., **Continuous magnetic recordings on Deception I., 1991-1992** [Análisis del registro magnético continuo durante las crisis sísmicas en Isla Decepción (Campaña 91-92)], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.137-146, In Spanish with English summary. 15 refs.

During the occurrence of the seismic event detected on Deception I. by the 1991-1992 Spanish expedition, a proton magnetometer was in continuous operation to provide information on the magnetic field as indicator of the volcanic activity. Analysis of the data shows that the field's total intensity increased about 12.5 nT during 24 days, suggesting a local effect

interpreted as an intrusion. A model of a uniformly magnetized sphere was used to approximate the magnetic moment and the magnetization of the source of this total-intensity variation.

#### L-57831

Felpeto, A., Blanco, I., Del Rey, R., Morales, J., **Low frequency events recorded on Deception I.** [Estudio de eventos de baja frecuencia registrados en Isla Decepción], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.147-154, In Spanish with English summary. 11 refs.

Volcanic tremor is a denomination for a wide range of seismic signals generated by volcanic activity with the common characteristics of spectral stability and few and well-defined spectral peaks. The origin of the volcanic tremors recorded at Deception I. has been interpreted as acoustic emission of gas phases in uppermost ducts. In this paper, a series of low frequency events is analyzed in terms of power spectra and horizontal polarization. With this method, three different resonators were identified. (Auth.)

#### L-57832

Navarro, F., **Geophysical investigations in Antarctica** [Nuevas perspectivas de la investigación geofísica en la Antártida], Actas del V Simposio Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 5th. Proceedings). Edited by J. Cacho and D. Serrat, Madrid, Comisión Interministerial de Ciencia y Tecnología, [1994], p.155-160, In Spanish with English summary. 16 refs.

The research proposals are focused on the field of Earth tides, concerning the identification of annual and semiannual solar tides, the study of the tidal effects of the regression of the nodes of the lunar orbit, and the analysis of the residual diurnal and semidiurnal tides. (Auth.)

#### L-57891

Tanaka, T., Kanao, M., **Seismological bulletin of Syowa Station, Antarctica, 1995, Japanese Antarctic Research Expedition.** *JARE data reports*, Mar. 1997, No.222, 103p., 7 refs.

The observation system at Showa Station is described and shown in a schematic diagram; the frequency responses of the seismometers and epicenter locations of seismic events recorded at Showa Station are shown in graphs and charts; the arrival-time data are listed, as are the corresponding hypocenters of 896 teleseismic events detected at Showa Station between Jan. 1 and Dec. 31, 1995. An appendix contains examples of digital waveforms on the BRB outputs for 23 events.

#### L-57981

Damaske, D., **Aeromagnetic programme of GANOVEX VI - lay-out, execution, and data processing, Geologisches Jahrbuch. Reihe B**, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.295-319, With German and Russian summaries. 21 refs.

During the GANOVEX VI expedition an aeromagnetic program was conducted in two areas of the Ross Sea sector of Antarctica: one survey addressed the geotectonic problems of the Ross Sea depression in the area of the northwestern Ross Ice Shelf and McMurdo Sound, the other survey concentrated on the Bowers Mountains. The surveys were set up with a standard profile line spacing of 4.4 km and tie-line spacing of 22 km. Both surveys were flown at a constant altitude of 2000 ft over the ice shelf and sea ice areas and 9000 ft in the mountainous areas of northern Victoria Land. A fixed-wing aircraft carried the magnetometer and the navigation system. Besides the aircraft's standard Inertial Navigation System (INS), the Trident IV radio location system installed in the area was used for positioning the flight lines. McMurdo was the base for the southern survey and a field camp at Cape Williams was the base for the northern survey. A total of 16,400 km of survey lines were flown. After processing the data, maps of the anomalies of the total magnetic field were produced, covering nearly 45,000 km<sup>2</sup>. (Auth. mod.)



**L-57983**

Reitmayr, G., **Rapid method for gravity terrain corrections using a spreadsheet program, such as EXCEL<sup>®</sup> or LOTUS-123<sup>®</sup>**, *Geologisches Jahrbuch. Reihe B*, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.333-342, With German and Russian summaries. 11 refs.

A practical method was developed for the topographic correction of the gravimetric survey data obtained during the German expeditions in northern Victoria Land. The area with the measuring point in the center is divided into pie-shaped segments whose surface varies with distance from the center according to hyperbolic functions. The earth's surface has to be digitized at characteristic points along the radial side of each segment using a topographic map. The coordinates are entered in a preconfigured table of a spreadsheet program, such as Excel<sup>®</sup> or Lotus-123<sup>®</sup>. The gravity correction is immediately calculated and automatically entered into this table. The algorithm was also programmed in Basic so that the option of making linear changes in altitude along the radius of the segments is also available. (Auth.)

**L-57984**

Reitmayr, G., Thierbach, R., **Gravity surveys in northern Victoria Land, Antarctica, during GANOVEX VI**, *Geologisches Jahrbuch. Reihe B*, 1996, No.89, Polar Issue 6, German Antarctic North Victoria Land Expedition, GANOVEX: From Oates Coast to Marie Byrd Land. Edited by N.W. Roland, p.343-370, With German and Russian summaries. 22 refs.

In 1990-91, measurements were made in the areas of Cape Williams and the Terra Nova Bay. At each measuring point, the coordinates were determined using the Global Positioning System (GPS). Owing to the conditions prevailing in the survey area, evaluation of the data required special corrections. A major source of error was the imprecise knowledge of ice thicknesses, especially lateral changes and errors in the topographic maps. A compilation of the empirical data and the values calculated from them are presented; the complete Bouguer and free-air gravity anomalies are represented on colored maps together with earlier data for the survey areas. The most conspicuous feature is a decrease by about 250 mGal in the Bouguer values from the Ross Sea coast to the inland part of Terra Nova Bay survey area. This is presumably an expression of the thickening of the continental crust inland from the Ross Sea. A similar gravity gradient does not appear in the Cape Williams area. (Auth. mod.)

**L-58080**

Suriñach, E., Galindo-Zaldivar, J., Maldonado, A., Livermore, R., **Large amplitude magnetic anomalies in the northern sector of Powell Basin, NE Antarctic Peninsula**, *Marine geophysical researches*, Feb. 1997, 19(1), p.65-80, 37 refs.

Magnetic profiles show large amplitude anomalies along a 100 km wide band in the northern margin of the Powell Basin. The anomalies are attributed to the continuation of the two branches of the Antarctic Peninsula Pacific Margin Anomaly (PMA). Interactive modelling shows the main features of the magnetic source bodies within the continental crust. These are elongated in a N60°E trend, and their base is at a depth exceeding 15 km. Equivalent magnetic susceptibilities are obtained. Bathymetric trends and basement geometry are consistent with the upper surface of magnetic bodies. Three different geometries of connection between the anomalies in the Powell Basin margins and the PMA branches are discussed. The apparent splitting of the southern branch of the anomalous body indicates that it was emplaced before Oligocene times and that it was subsequently fragmented during the Cenozoic. (Auth. mod.)

**L-58136**

Kubo, A., Kanao, M., **Crust-mantle decoupling revealed by seismic velocity anisotropy beneath Syowa Station, Antarctica**, *Antarctic record*, July 1997, 41(2), p.497-512, In Japanese with English summary. Refs. p.510-512.

The authors analyzed shear wave splittings in the crust beneath Showa Station, using Moho converted Ps waves. Three sets of receiver functions and stacked receiver functions from Tonga events are analyzed. Results are interpreted by combining with seismic anisotropy in the mantle, which

have been revealed by SKS splitting. The observed fast polarized direction of crustal shear wave splitting shows N50°W, which is nearly perpendicular to that in the mantle (N49°E). Delay times of crustal anisotropy reach 0.5 s. Although part of crustal anisotropy can be caused by the deformation due to Gondwana's breakup, the most plausible explanation of crust-mantle decoupled anisotropy is related to the collisional deformation 500 Ma. If delamination between the crust and the mantle occurred in a former stage of metamorphism with subsequent crustal extrusion and mantle subduction, then observed seismic anisotropy in both the crust and the mantle can be explained. (Auth.)

**L-58245**

King, E.C., Leitchenkov, G., Galindo-Zaldivar, J., Maldonado, A., Lodolo, E., **Crustal structure and sedimentation in Powell Basin**, *American Geophysical Union. Antarctic research series*, 1997, Vol.71, Geology and seismic stratigraphy of the antarctic margin, 2. Edited by P.F. Barker and A.K. Cooper, p.75-93, Refs. p.92-93.

Powell Basin is a small ocean basin which lies off the northeast end of the Antarctic Peninsula. The crustal velocity-depth structure in the northern part of the basin, determined by a reversed seismic refraction profile, matches that of typical oceanic crust. A possible relict spreading axis which trends NW-SE through the center of the basin has been identified on seismic reflection profiles. A gravity low on satellite gravity maps coincides with the interpreted spreading axis. Magnetic anomalies over the basin are of very low amplitude and there is no discernible spreading pattern. Sediments are up to 2 km thick in the central part of the basin, and 3 km thick beneath the continental rise to the east and west. There is a lower sedimentary unit with low reflection amplitudes and a conformable upper unit with high reflection amplitudes. The change in character between the two is interpreted as evidence for glacial-interglacial cyclicity in the supply of coarse detritus to the basin. (Auth. mod.)

See also:

A-56679 A-57487 C-57541 C-58173 E-56419 E-56512 E-56520  
E-56567 E-56587 E-56589 E-56598 E-56759 E-56761 E-56832  
E-56905 E-56916 E-56949 E-56957 E-56959 E-57094 E-57140  
E-57243 E-57360 E-57448 E-57481 E-57482 E-57501 E-57535  
E-57655 E-57740 E-57749 E-57793 E-57837 E-57838 E-57919  
E-57969 E-57980 E-57997 E-58062 E-58106 E-58130 E-58183  
E-58184 E-58241 E-58345 F-56476 F-56477 F-56599 F-57512  
F-57540 F-57750 F-58231 I-57057 I-57931 J-56958 K-56402



## M. POLITICAL GEOGRAPHY

### M-56386

Young, E.C., **Conservation values, research and New Zealand's responsibilities for the southern ocean islands and Antarctica**, *Pacific conservation biology*, 1995, Vol.2, p.99-112, 56 refs.

New Zealand has direct responsibility for the conservation and protection of five subantarctic island groups (Snares, Bounty, Antipodes, Auckland and Campbell), all of which are protected within National reserves. New Zealand also claims the Ross Dependency in Antarctica sharing conservation responsibility with others within the Antarctic Treaty regime. The subantarctic islands' ecosystems are of interest for their range of species, for their dependence on marine nutrients, for their vulnerability to introduction by alien species, and for illustrating the outcomes of independent evolutionary experiments. Each is characterized by a unique assemblage of plant and animal species, of which the diversity of oceanic birds (especially their albatrosses, petrels and penguins) and of the changes with latitude of their vegetation cover is internationally regarded. They form an interesting contrast to the sparse biota of the Balleny Is. and continental Antarctica. The fauna and flora on these subantarctic islands are now substantially catalogued and the impact of alien species in part understood, but ecological studies have been hampered by isolation and difficult access. Ecological research is needed to ensure that management strategies for each island are well founded on an understanding of their individual ecosystems. By way of contrast, ecological research has flourished in Antarctica with many long-term programs. This difference is attributed to the way research is promoted and supported in the two regions. (Auth.)

### M-56465

U.S. Congress. Senate. Committee on Foreign Relations, **Antarctica legislation: S. 2575; S.J. Res. 206 and S. Res. 186: Hearing before the Committee on Foreign Relations, U.S. Senate, One Hundred First Congress, Second Session, July 27, 1990**, Washington, D.C., U.S. Government Printing Office, 1990, 114p.

The hearing convened on July 27, 1990, to receive proposals to further US efforts to negotiate the prohibition of prospecting, exploration and development of resources of the antarctic continent, and to address deficiencies in the 1988 Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA).

### M-56491

Da Costa Pinto, R., **Legal-international analysis of the importance of Antarctica to South America** [A Antártica e sua importância para a América do Sul (uma análise jurídico-internacional)], Recife, Brazil, FASA EDITORA, 1991, 58p., In Portuguese. 68 refs.

**DLC KWX465.P56 1991**

The 4 short chapters of this book expand on the title, the importance of Antarctica to South America, from the following points of interest: the antarctic environmental systems and international law; activities of international organizations regarding the antarctic question; prospects for changing the Antarctic Treaty; and territorial claims in Antarctica.

### M-56492

Fraga, J.A., **Antarctic ecological reserves at the Treaty's 30th anniversary** [La Antártida: reserva ecológica al cumplir 30 años su tratado], Buenos Aires, Argentina, Instituto de Publicaciones Navales del Centro Naval, 1992, 285p., In Spanish. Refs. p.281-285.

**DLC KWX70.F73 1992**

This book consists of three parts which consider the following geopolitical issues: the elements of antarctic controversy, the appraisal of the antarctic situation, and the proposal for Argentine Antarctica. This includes

an analysis of antarctic geographic, historic, legal and political factors, and international, Argentina's in particular, global, regional, maritime, spatial and terrestrial strategies. The Antarctic Treaty System and the management of antarctic natural and economic resources are reviewed.

### M-56769

Bondareff, J., Pittman, L., **Increased attention to ocean and coastal protection legislation in the 101st Congress**, Coastal zone '91, vol. 1. Proceedings of the Seventh Symposium on Coastal and Ocean Management, Long Beach, CA, July 8-12, 1991. Edited by O.T. Magoon, H. Converse, V. Tippie, L.T. Tobin, and D. Clark, New York, American Society of Civil Engineers, 1991, p.286-300 (Pertinent p.290-291), 38 end notes (refs.); (Pertinent notes: 18, 19, and 20).

**DLC HT391.S935 1991 vol.1**

For all the grumbling about the ineffectiveness of Congress, the 101st Congress produced a surprising number of critical pieces of coastal- and ocean-related legislation, and began the process of developing other programs. This paper will summarize selected key ocean and coastal environmental bills enacted during the past Congress and analyze what we can expect from the 102nd Congress in the marine environmental area. (Auth.)

### M-56771

Ticco, P.C., **Strategies for the international stewardship of coastal and marine resources of Antarctica**, Coastal zone '91, vol. 4. Proceedings of the Seventh Symposium on Coastal and Ocean Management, Long Beach, CA, July 8-12, 1991. Edited by O.T. Magoon, H. Converse, V. Tippie, L.T. Tobin, and D. Clark, New York, American Society of Civil Engineers, 1991, p.3530-3540, 15 refs.

**DLC HT391.S935 1991 vol.4**

The formulation and realization of several international agreements has successfully governed Antarctica and its surrounding seas for three decades. Today, given the increased real and perceived importance of Antarctica and its resources, it is clear that the next step must be taken, namely, that global scientific inquiry, political initiatives, and the management of antarctic coastal and marine resources must be combined to create and implement a system of wise stewardship. This will be achieved through the use of current international treaties, new agreements, and greater scientific efforts. This paper presents an overview of the many issues associated with the management of antarctic coastal and marine resources; examines the concept of the international stewardship of this global commons; and offers recommendations for future actions.

### M-56871

Beck, P.J., **Through Arctic eyes: Canada and Antarctica, 1945-62**, *Arctic*, June 1995, 48(2), p.136-146, With French summary. 87 refs.

This archival study investigates the nature and development of Canadian attitudes and policy towards Antarctica between 1945 and 1962. Throughout this period, the key continuity was the tendency to view antarctic affairs from an arctic perspective. Canada, though becoming more preoccupied with the Arctic and avoiding active involvement in Antarctica, found it difficult to ignore the more remote and distant southern polar region. Although the Arctic and Antarctic are distinct regions in geographical, political, legal and other terms, they are both polar regions subject to a range of seemingly analogous controversies. As a result, certain post-1945 developments affecting Antarctica were deemed of potential relevance to its northern counterpart, thereby encouraging the Canadian government to consider the nature of its political, legal, scientific and other interests in Antarctica. Canada's efforts to remain on the sidelines were qualified by the fact that Antarctica was treated as a significant policy interest by other states—most notably, Australia, Britain and the United



States—which not only kept the Canadian government well informed about developments but also asked frequently for its views. In 1959 the conclusion of the Antarctic Treaty forced the Canadian government to consider whether or not to accede to the treaty. In the event, the government, guided by a series of interdepartmental exchanges, decided against accession, which did not take place until 1988. (Auth.)

#### M-56911

Bologna, A.B., **Argentine claims to the Falkland Is., South Georgia and the South Sandwich Is.** [Los derechos de la República Argentina sobre las islas Malvinas, Georgias del Sur (San Pedro) y Sandwich del Sur], Buenos Aires, Ediar, 1988, 293p., In Spanish. Refs. p.279-288.

**DLC JX4084.F34B67 1988**

The book discusses the discovery and settlement of the Falkland Is., South Georgia and the South Sandwich Is., Argentine and British claims to them, and negotiations concerning those claims.

#### M-56912

Singh, J.N., **Outer space, outer sea, outer land, and international law**, New Delhi, Harnam Publications, 1987, 296p., Refs. p.243-262.

**DLC JX4173.S52 1987**

Part 3 of this book, "Outer land" (p.191-234), is confined to the study of Antarctica from the point of view of international law. Considered are issues such as the identification of Antarctica, the territorial claims in Antarctica by many countries, their rights concerning access to it and exploration and exploitation of it, as well as their obligations and responsibilities to uphold certain fundamental rules of international law. It is emphasized that the highest priority in this area should be given to the protection and preservation of antarctic environments.

#### M-56924

Zang, D.M., **Frozen in time: the Antarctic Mineral Resource Convention**, *Cornell law review*, Mar. 1991, 76(3), p.722-768, 321 refs.

**DLC K3.O7 1990-91**

Section I of this article provides a brief history of human activity in Antarctica, and describes the main features of both the Antarctic Treaty and the Mineral Resources Convention. Section II considers the need for authority in international law for any exercise of jurisdiction, and assesses legal doctrines that may support the exercise of jurisdiction over Antarctica. Section III assesses the operation of the Treaty System over the past three decades, emphasizing the System's legal and political shortcomings. Finally, Section IV proposes a modification of the Treaty System to provide for broader and more open participation by the international community, incorporating the basic principles of the common heritage doctrine.

#### M-57009

Francioni, F., ed, Scovazzi, T., ed, **International law for Antarctica** [Droit international de l'Antarctique], *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, 532p., In English and French. Refs. passim. For selected papers see A-57029, E-57028 and M-57010 through M-57027.

**DLC JX4084.A5I58 1987**

This volume is the result of a research project carried out at the universities of Siena, Parma and Milan with the financial support of the Italian National Council for Scientific Research (C.N.R.). The project aimed at bringing together a group of international lawyers and experts from different backgrounds and experience in antarctic matters, which resulted in a collection of papers and communications presented in this volume. The material is grouped under the following headings: The Treaty of Washington and the development of the Antarctic System; Customary international law and Antarctica; Antarctica and the new law of the sea; Antarctic mineral resources; and Italian activities in Antarctica. A brief communication, "Italian Law of June 10, 1985 on the antarctic national program and antarctic resources in international law", and 2 documents, the Articles of the Italian Law No. 284, and an exchange of notes between Italy and New Zealand regarding scientific cooperation in Antarctica, conclude this volume.

#### M-57010

Van der Essen, A., **Origin and development of the Antarctic System** [Origine et développement du système antarctique], *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.7-22, In French.

**DLC JX4084.A5I58 1987**

Events leading to the signing of the Antarctic Treaty are reviewed, and the function, origin and implementation of each of the articles of the Treaty are summarized. A brief analysis of the Antarctic Treaty System concludes with a favorable assessment of its merits.

#### M-57011

Bosco, G., **Settlement of disputes under the Antarctic Treaty**, *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.23-26, 5 refs.

**DLC JX4084.A5I58 1987**

Article XI of the Antarctic Treaty and Article 25 of the Convention on the Conservation of Antarctic Marine Living Resources, both dealing with settlement of international disputes, are analyzed. In the process, their weaknesses and incompleteness are pointed out, stressing the need of a system for compulsory settlement (for instance, binding commercial arbitration as in Article 188 of the Law of the Sea Convention) taking into account that disputes, particularly those regarding mineral resources, will be numerous and complicated.

#### M-57012

Brunner, S., **Article 10 of the Antarctic Treaty revisited**, *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.27-51, 72 refs.

**DLC JX4084.A5I58 1987**

The wording of Article 10 of the Antarctic Treaty is found to contain many ambiguities, which are pointed out and examined in the light of different interpretations. A parallel analysis of the contents of other articles of the Treaty, which could further complicate understanding of Article 10, is carried out.

#### M-57013

Charney, J.I., **Antarctic system and customary international law**, *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.55-99, 82 refs.

**DLC JX4084.A5I58 1987**

It is argued that in Antarctica, at present, there exists a collage of laws derived from general and special international agreements, general customary international law, and obligations owed by third parties to international agreements. This law also appears to include special customary international law of Antarctica. It is concluded that, in the future, international law for Antarctica will expand to encompass additional topics, and that the regimes to enforce that law may be more complex.

#### M-57014

Francioni, F., **Antarctica and the common heritage of mankind**, *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.101-136, 61 refs.

**DLC JX4084.A5I58 1987**

The common heritage of mankind (CHM) concept was formally adopted as a legal norm in the 1979 Moon Treaty and in the 1982 Law of the Sea Convention. In more general terms, its legal content was foreshad-



owed in the 1967 Treaty of Principles Governing the Use of Outer Space. With respect to Antarctica, it is pointed out that the CHM has not yet received express recognition; the reasons for this omission are examined. The debate concerning the application of the CHM to Antarctica, its legal status in international law, and its relationship to sovereignty claims and to the exploitation of mineral resources, are reviewed. It is concluded that, in the case of Antarctica, there are many arguments to support the view that the principle of the CHM may be implemented in the existing institutional framework.

#### M-57015

Simma, B., **Does the Antarctic Treaty create an objective regime?** [Le Traité Antarctique: crée-t-il un régime objectif ou non?], *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.137-153, In French. 44 refs.

**DLC JX4084.A5I58 1987**

Historical and legal aspects of the Antarctic Treaty conducive to, or against, the establishment of an objective antarctic regime within the framework of international law, are considered. Articles of the Treaty are examined to determine if their norms can become binding, not as local or regional, but as general customary rights.

#### M-57016

Moncayo, G.R., **Utilization of Antarctica toward pacific ends** [L'utilisation de L'Antarctique à des fins pacifiques], *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.155-185, In French. 48 refs.

**DLC JX4084.A5I58 1987**

As one of the essential disposition of the Antarctic Treaty, the principle of pacific utilization of Antarctica is analyzed for its content, conditions, the degree of its effectiveness and its juridical significance. It is concluded that, based on the excellence of international cooperation in Antarctica, the above principle imposed by the Treaty has shown very positive results.

#### M-57017

Pineschi, L., **Antarctic Treaty System and general rules of international environmental law**, *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.187-246, 129 refs.

**DLC JX4084.A5I58 1987**

This paper considers the following: the general duty to counteract significant transboundary interference; application of this duty to Antarctica; the regulation of specific activities; the duty to prevent or abate activities which entail the significant risk of causing environmental harm: a due care obligation. Evaluation of the measure of due diligence; the duty to assess the environmental impact of planned activities in Antarctica; the general obligation to cooperate; exchange of information under the Antarctic Treaty System; institutionalized cooperation in the Antarctic Treaty area; and the prime responsibility claimed by the Antarctic Treaty Consultative Parties and third States. (Auth. mod.)

#### M-57018

De Cesari, P., **Regime of scientific research**, *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.247-277, 81 refs.

**DLC JX4084.A5I58 1987**

The regime of scientific research in the Antarctic Treaty System is outlined as follows: freedom of scientific investigation; cooperation and exchange of information; coordination of scientific activities in Antarc-

tica; scientific research and the need for preservation and conservation of the resources; scientific research and the regime of antarctic mineral resources; rights and obligations of third-party States; and sphere of the application of the antarctic regime of scientific research. (Auth. mod.)

#### M-57019

Treves, T., **United Nations General Assembly, Antarctica and the Law of the Sea Convention**, *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.281-289, 14 refs.

**DLC JX4084.A5I58 1987**

The debate on the question of Antarctica held at the United Nations General Assembly in 1985 was concluded by the adoption of resolutions by vote. The practice of consensus that had prevailed in the debates of 1983 and 1984 was abandoned. Although there were no votes against the three resolutions passed, there were abstentions, and, most importantly, a substantial number of States—including the overwhelming majority of the parties to the Antarctic Treaty—declared during the roll-call of votes that they were not participating in the vote. Various reasons why the States that are parties to the Antarctic Treaty are unhappy with the proposal to discuss the Law of the Sea Convention in conjunction with the Treaty are considered.

#### M-57020

Scovazzi, T., **Antarctic coastal zones** [Les zones côtières dans l'Antarctique], *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.291-339, In French. 115 refs.

**DLC JX4084.A5I58 1987**

This paper considers the following: general aspects of the law of the sea; antarctic coastal zones claimed by seven States; new claims and extension of claims previously declared; applicability of certain recommendations adopted by the consultative parties concerning marine investigations and the convention on the protection of seals; the agreement to not agree on issues concerning the jurisdiction of coastal States; and the concept of the common heritage of mankind in the light of the agreement to not agree.

#### M-57021

Vignes, D., **Regime of the antarctic marine living resources** [Le régime des ressources biologiques marines de l'Antarctique], *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.341-366, In French. 23 refs.

**DLC JX4084.A5I58 1987**

Negotiations leading to the signing and implementation of the Antarctic Treaty are reviewed. Several articles of the Treaty, particularly those dealing with territorial claims, exploitation of marine living resources and the law of the sea, are discussed. The conventions of 1980 and 1982, and the resulting conservation measures, are described.

#### M-57022

Barnes, J.N., Lipperman, P.J., **U.N. Convention on the Law of the Sea and Antarctica**, *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.367-379, 23 refs.

**DLC JX4084.A5I58 1987**

The northernmost reach of the Antarctic Treaty of 1959 is set at the 60°S line. The Convention on the Conservation of Antarctic Marine Living Resources extends its jurisdiction to the northern limits of the Antarctic Convergence, significant portions of which lie beyond 60°S. It is at this northernmost extent of the Antarctic Treaty System (ATS) that a future minerals regime may first come into conflict with the seabed provisions of



the United Nations Convention on the Law of the Sea (UNCLOS). By working southward from the hypothetical maximum northern extent of a future antarctic minerals regime, and examining at each step the norms of international law that would support or oppose the jurisdiction of such a regime, the author finds it possible to suggest where the authority of the ATS over maritime mineral resources ends, and that of the International Sea-Bed Authority, established by the UNCLOS, begins.

#### M-57023

Migliorino, L., **New law of the sea and the deep seabed of the antarctic region**, *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.381-394, 43 refs.

**DLC JX4084.A5I58 1987**

This paper considers the following: The regime of the deep seabed of the antarctic region within the traditional law of the sea; the impact of the new law of the sea: the applicability of the common heritage of mankind principle; the applicability of the relevant provisions of the 1982 United Nations Convention on the Law of the Sea and of national legislations on deep seabed mining; and implications for the Antarctic Treaty System's conventions. (Auth. mod.)

#### M-57024

Maffei, C., **New trends in the protection of whales**, *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.395-420, 89 refs.

**DLC JX4084.A5I58 1987**

This paper considers the following: recent provisions in the framework of the Convention for the Regulation of Whaling; whaling in antarctic waters; the United Nations Convention on the Law of the Sea and the protection of marine mammals; and an important decision of a United States Court. (Auth. mod.)

#### M-57025

Trombetta-Panigadi, F., **Antarctic icebergs and international law**, *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.421-441, 47 refs.

**DLC JX4084.A5I58 1987**

This paper considers the following: the Antarctic Treaty System and icebergs; various kinds of ice formation; iceberg exploitation and the law of the sea; and potential consequences of the transport of icebergs. (Auth. mod.)

#### M-57026

Ronzitti, N., **Regime of mineral resources in Antarctica**, *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.445-465, 37 refs.

**DLC JX4084.A5I58 1987**

Two schools of thought are contending with one another in relation to the proper forum for negotiating a mineral regime for Antarctica: a closed forum consisting only of States parties to the Antarctic Treaty; and a wider forum, consisting of all member States of the United Nations. The mineral regime now being negotiated comes within the framework of the first option. The negotiating process among the Consultative Parties is going on together with the discussion of the antarctic question in the United Nations. The problem of the lawfulness of mineral exploitation in Antarctica has two aspects: the first is related to the compatibility between the 1959 Antarctic Treaty and a future treaty on mineral exploitation; and the second regards the lawfulness of mineral exploitation under customary international law. Both aspects are analyzed.

#### M-57027

Bastianelli, F., **Mining potential in Antarctica: conditions and legal regime** [Le potentiel minier de l'Antarctique: conditions opérationnelles et régime juridique], *Collana di studi, Istituto di diritto pubblico e internazionale, Facoltà di giurisprudenza, Università degli studi di Siena*, 1987, No.4, Droit international de l'Antarctique/International law for Antarctica. Edited by F. Francioni and T. Scovazzi, p.467-481, In French. 4 refs.

**DLC JX4084.A5I58 1987**

After describing the hostile antarctic environment, the question is raised as to why the member countries of the Antarctic Treaty find it necessary to establish a mineral regime to regulate the exploration and exploitation of antarctic mineral resources in spite of already existing legal norms applicable to other types of activities in Antarctica (e.g., the protection of marine living resources). Various aspects of the question, and the problems related to difficult operational conditions, are considered. It is concluded that the norms defined in the document of Mar. 29, 1984 "Antarctic Mineral Resource Regime: Draft Articles", represent the first step toward the permanent colonization of the least hospitable of continents.

#### M-57386

United States Antarctic Program External Panel, **United States in Antarctica. Report of the U.S. Antarctic Program External Panel**, Washington, D.C., Apr. 1997, 94p., 13 refs.

This document represents the final report of the United States Antarctic Program External Panel. The report has the unanimous approval of all 11 panel members and draws upon their collective experience which includes some 44 individual trips to Antarctica, involving visits to all three U.S. stations, each research ship, support icebreakers and numerous field sites. As a panel, they visited McMurdo Station and Amundsen-Scott Station and toured support facilities at Christchurch. It is concluded that the U.S. Antarctic Program is well managed, involves high quality science and is important to the region as well as to the United States. They also believe that in the current budget environment, costs must be reduced, preferably through increased efficiency and "reinvention," but, if not, through reduced scope. Recommendations are offered herein to help ensure the continued viability of the program into the 21st century.

#### M-57470

Burgess, J.R., **Future of the Antarctic Treaty System**, *Australian foreign affairs record*, Sep. 1988, 59(9), p.370-372.

**DLC JX1162.A33**

This paper was delivered by the author to the International Geographic Conference, at Sydney University, on Aug. 25, 1988. Its main thesis is that the prognosis for the Antarctic Treaty System is good. In reviewing the Antarctic Treaty, some reference is made to the effects of the Treaty on Australia.

#### M-57503

Villacrés Moscoso, J.W., **Ecuador's claim to Antarctica** [Los derechos del Ecuador en la Antártida], *Revista geográfica*, 1987, No.26, p.37-43, In Spanish.

A brief review is presented of the sustained interest in Antarctica, since 1967, of the government of Ecuador. The validity of Ecuador's claim to Antarctica, based on the Quadrant Condominiums theory and the concept of South American Antarctica for the Latin Americans, is discussed.

#### M-57514

**U.S. ratifies antarctic treaty**, *Science*, May 2, 1997, 276(5313), p.685.

A brief announcement is made that, six years following its promulgation in Madrid, the United States has ratified the Antarctic Environmental Protocol to the Antarctic Treaty.

#### M-57646

Van der Lugt, C., **International environmental regime for the Antarctic: critical investigations**, *Polar record*, July 1997, 33(186), p.223-238, Refs. p.234-237.

This article seeks to illustrate how the theory of international regimes can be applied to the Antarctic Treaty System (ATS). The focus is on the events of the 1980s, during which international awareness of a global envi-



ronmental crisis severely tested the robustness of the ATS. Three approaches to regime formation and change are considered to explain the rejection of the Convention for the Regulation of Antarctic Mineral Resource Activities and the acceptance of the 1991 Protocol on Environmental Protection to the Antarctic Treaty. The three approaches employed are game theory, functional theories, and cognitive explanations. The evolution of a new epistemic consensus on the value and the future of the antarctic crystallizes, signifying a key role on the part of natural scientists and environmental non-governmental organizations. It is concluded that the ATS as a whole can today be described as an international environmental regime. (Auth. mod.)

See also:  
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- See [also]:* Particulates

## Age determination

*See: Geochronology. Also used as subordinate term under various types of ice (snow)*

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*See: Atmosphere*

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*See: Cargo operations/Air; Transportation/Air*

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*See [also]:* Navigation/Air; Transportation/Air

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*Used in Category I or in Subfld c under F, Ice and snow*

## Algae

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*See: Arthropoda; Aves; Biogeography/Zoogeography; Bryozoa; Coelenterata; Echinodermata; Ecology/Faunal; Mammalia; Mollusca; Pisces; Plankton/Zooplankton; Porifera; Protochordata; Protozoa; Vermes*

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*See: Aves-Anseriformes*

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See [also]: Nutrition

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*See:* Low temperature effects; Sea water/Thermal properties; Stratosphere/Sudden warming. *Also used as subordinate term under Atmosphere; Meltwater; Ocean; Upper air and various types of ice (snow)*

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*See:* Aves-Charadriiformes

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B-56511
- New Hampshire, University**  
F-57991, K-56571, K-57284, K-57286
- New Mexico Institute of Mining and Technology**  
E-57781, E-58130, E-58235
- New Mexico, University**  
B-58341
- Northeastern University**  
B-57644, B-57685
- Northern Illinois University**  
E-58251
- Oceanites, Inc.**  
A-58290
- Ohio State University**  
E-56354, E-56901, E-57518, E-58244,  
F-56433, F-57882, I-56909, I-57694, I-57701,  
I-57702
- Ohio University**  
B-56859
- Old Dominion University**  
B-56579, J-58273
- Oregon State University**  
J-56977
- Oregon, University**  
E-57686
- Pacific Lutheran University**  
G-57206
- Pennsylvania State University**  
E-58251, F-56896, F-57782, I-57698
- Point Reyes Bird Observatory**  
B-57078
- Purdue University**  
E-56379
- San Francisco, University**  
B-58228, B-58326, E-57137
- Scripps Institution of Oceanography**  
B-57093, J-57402
- Southern California, University**  
B-57223
- St. Olaf College**  
F-57208
- Stanford University**  
K-57340, K-57664, K-57746, K-57921,  
K-57922
- State University of New York**  
B-57499, I-56987, I-56988, I-57172
- Tennessee, University**  
B-56894, B-57082, B-57675
- Texas A and M University**  
A-58291
- Texas, University**  
E-57481, F-57208, L-56562
- U.S. Army Cold Regions Research and Engineering Laboratory**  
F-56569, F-57657, G-57885
- U.S. Geological Survey**  
C-57988
- U.S. National Aeronautics and Space Administration**  
B-57049, E-57482
- U.S. National Marine Mammal Laboratory**  
B-57958
- Vassar College**  
F-57750
- Washington, University**  
B-56673, F-56882, F-57211, F-57212,  
F-57335, F-57341, I-56674, I-56941, I-57699,  
I-58126, J-56977
- West Virginia, University**  
B-57804
- Wisconsin, University**  
B-57049, E-56792, E-57121, E-57136,  
I-56909, I-57265, I-58159
- Woods Hole Oceanographic Institution**  
B-58109, E-57997
- Wyoming, University**  
I-56897, I-57551, I-57695
- Yale University**  
F-56450































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